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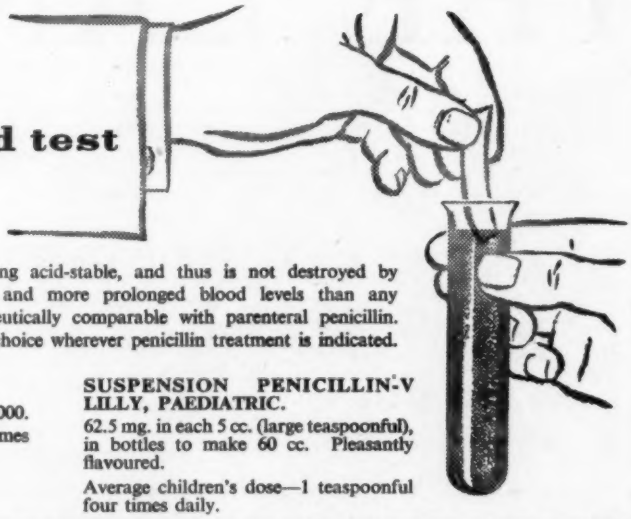

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CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT

ORIGINAL ARTICLES

Byssinosis in Cotton and Other Textile Workers
R. S. F. SCHILLING, M.B.C.P. 261
(*to be concluded*)

Blood Volumes in Gastroduodenal Hæmorrhage
D. J. TIBBS, F.R.C.S. 266

The Diagnosis of Poliomyelitis
W. F. T. MCMATH, M.R.C.P.
A. M. RAMSAY, M.D.
A. D. MACRAE, M.D. 275

Hypothyroidism
D. N. BARON, M.D. 277

Pilonidal Sinus of the Umbilicus
DAVID PATEY, F.R.C.S.
E. S. WILLIAMS, B.SC. 281

Phæochromocytoma
H. WEIL-MALHERBE, M.D. 282

Identification of Hydroxytyramine in a Chromaffin Tumour
MARY MCMILLAN, M.B. 284

Purpura Gangrenosa
K. B. TAYLOR, M.R.C.P.
F. W. WRIGHT, B.M. 284

After Fifty Years: a Diagnosis of Thoracic Aneurysm Corrected
C. B. WAY, M.B.
J. L. HAMILTON-PATERSON, M.D. 287

Intestinal Obstruction by Food
J. T. ROWLING, F.R.C.S. 289

NEW INVENTIONS

A Refrigeration Applicator
Prof. J. D. MCGEE, PH.D. 290

REVIEWS

Notices of Books 292

SPECIAL ARTICLES

Flour and Bread 301
Central Health Services Council 301

MEDICINE AND THE LAW

Secret Justice 304
N.H.S. and the Press 304

IN ENGLAND NOW

A Running Commentary by Peripatetic Correspondents 305

LEADING ARTICLES

SPREAD OF ANTIBIOTIC-RESISTANT BACTERIA 293
METHODS IN CANCER RESEARCH 293
LET HIM BE FIT 294

ANNOTATIONS

The New Mental-health Officer 295
The Lungs in Congestive Heart-failure 296
Myxomatosis 296
Mesenteric Occlusion 297
The Lister Institute 297
Cause of Peptic Ulcer 298
The Remuneration Claim 298

Index to THE LANCET 298

CONFERENCES AND CONGRESSES

International Congress of Pædiatrics 299

BEFORE OUR TIME

A Norwich Surgeon's Diary 302

PUBLIC HEALTH

Local-government Reform: an Instalment? 303
Infectious Diseases in England and Wales 304

LETTERS TO THE EDITOR

Infection of the Newborn (Dr. Victoria Smallpeice) 306
Prolonged Chemotherapy in Chronic Pulmonary Tuberculosis (Prof. Robert Knox, F.R.C.P.; Dr. F. N. Sickenga) 306
Idiopathic Hypercalcæmia of Infancy (Dr. J. O. Forfar, Mr. S. L. Tompsett, D.SC.) 306
The Definition of Psychosomatic Disorder (Mr. Nigel Walker, PH.D.) 307
Malignant Pustule in the Ileum (Colonel L. W. Harrison, F.R.C.P.E.) 307
Primary Atypical Pneumonia (Squadron-Leader John Gilroy, M.B.) 307
A Modified Pinard's Fœtal Stethoscope (Mr. M. R. Fell, M.R.C.O.G.) 308
The Casualty Department (Dr. I. Rose) 308
Thermometers for Hypothermia (Dr. S. D. K. Stride, Mr. R. W. Davis, L.I.B.S.T.) 308
The Iron Lung from the Inside (Dr. M. V. Smith) 309
Psychotherapy in Ulcerative Colitis (Dr. Gordon Ambrose) 309
Pleuropericarditis (Dr. E. F. Murphy) 309
The Susceptible State in Poliomyelitis (Dr. E. H. Evans) 309
Orotracheal Connections with Minimal Resistance (Dr. John Bullough) 310
Erythema Nodosum as a Manifestation of Sarcoidosis (Dr. Hugh Garland) 311
Calorie Intake in Relation to Body-weight Changes in the Obese (Dr. W. A. Ball) 311

OBITUARY

Robert John McConnell 311

NOTES AND NEWS

Ministry of Pensions and National Insurance 311
A 19th-century Character 311
Railway Medical Services 312

University of Oxford 312
University of London 312
Royal College of Surgeons of England 312
Institute of Laryngology and Otology, London 312
United States Public Health Service 312
Royal Institute of Public Health and Hygiene 312
University of Edinburgh 312
Society for General Microbiology 312
Royal Masonic Hospital, London 312
Tobacco Manufacturers' Standing Committee 312

Appointments 312
Births, Marriages, and Deaths 312

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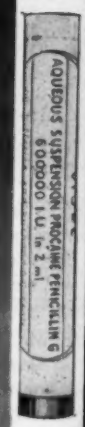

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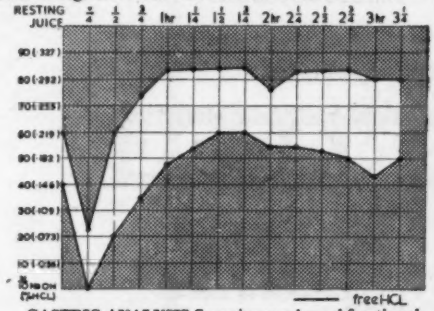

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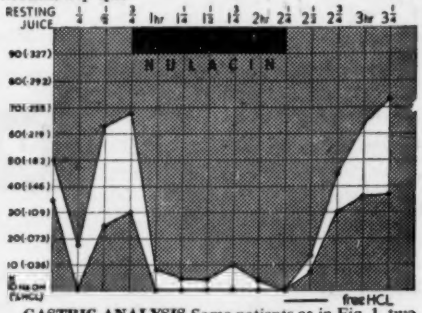

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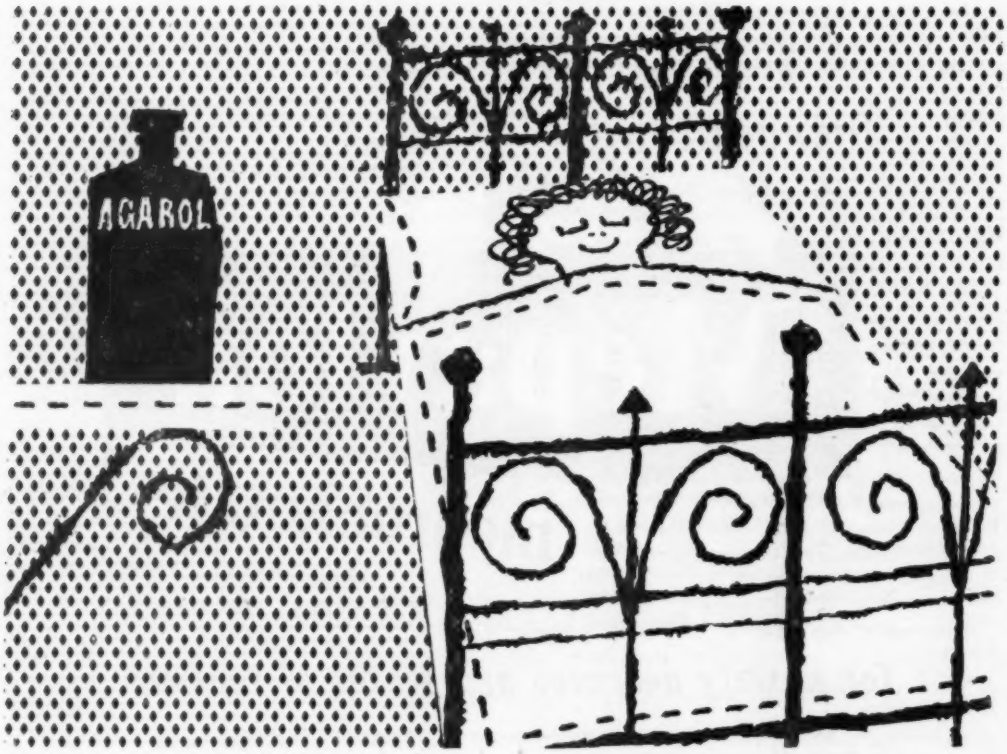

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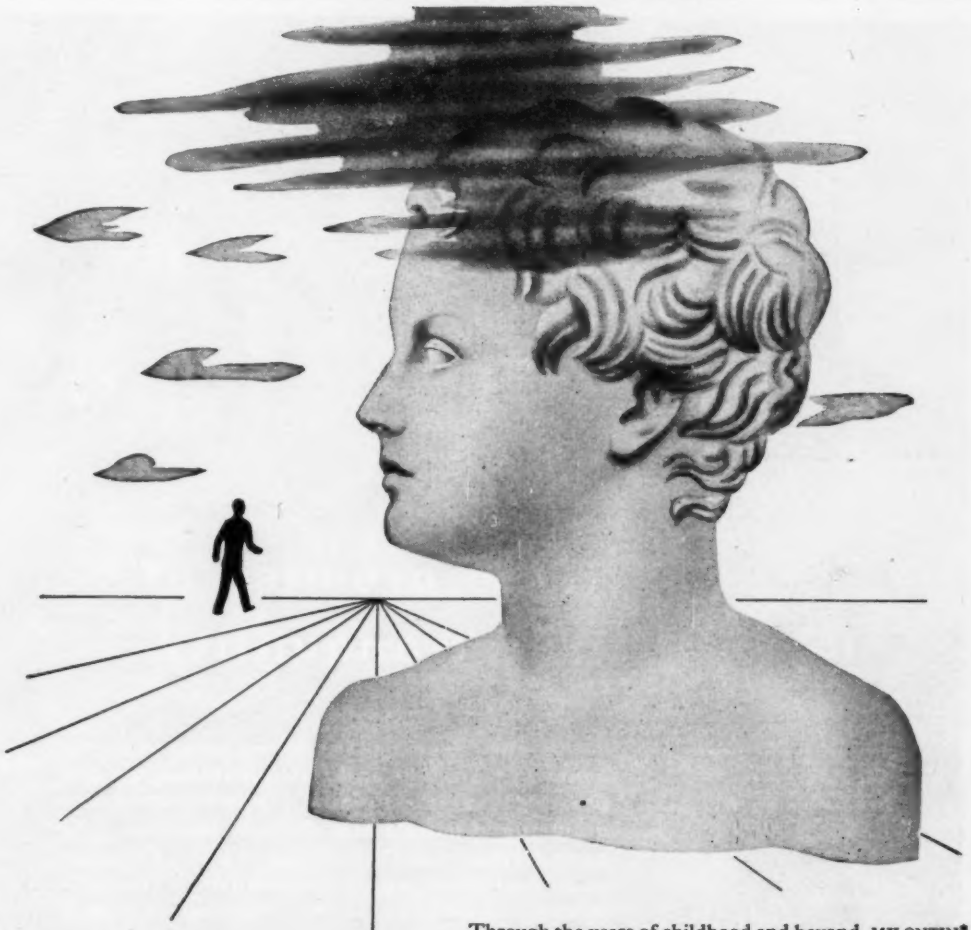

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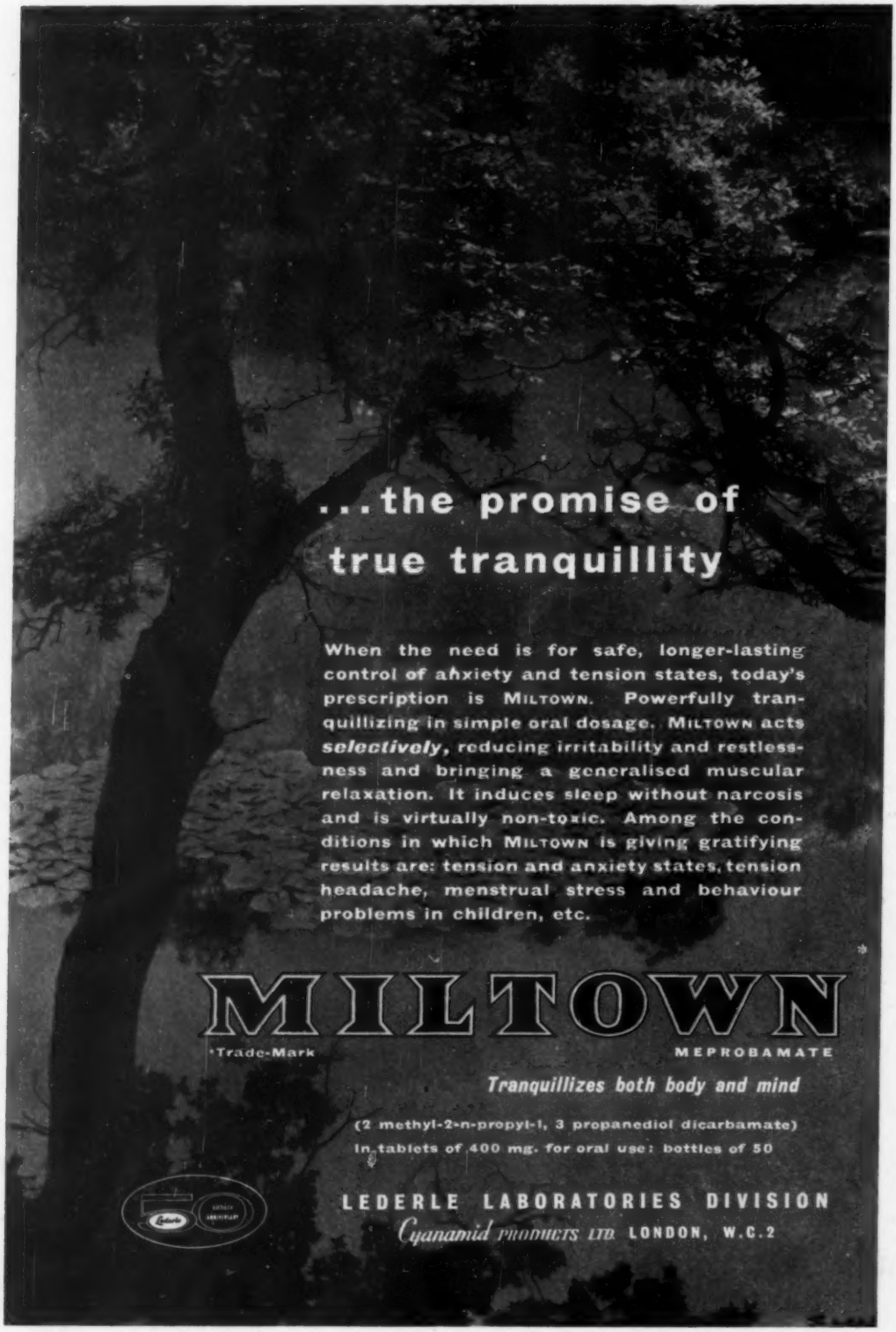
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1 *J. Pharm. Pharmacol.*, 1953, **5**, 849
2 *Schweiz.med.Wschr.*, 1955, **85**, 222
3 *Tubercle*, 1955, **36**, 209

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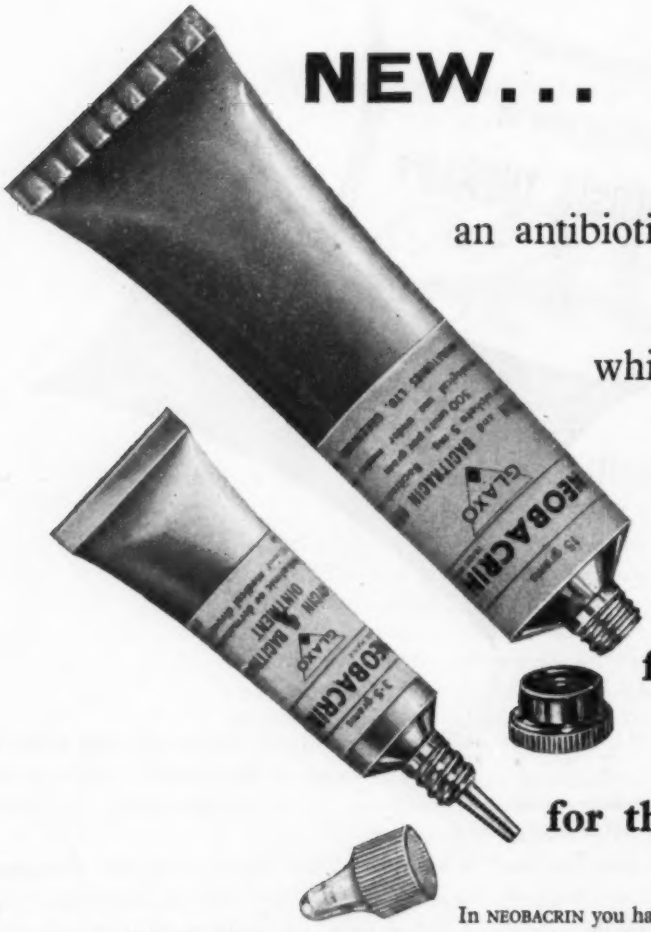

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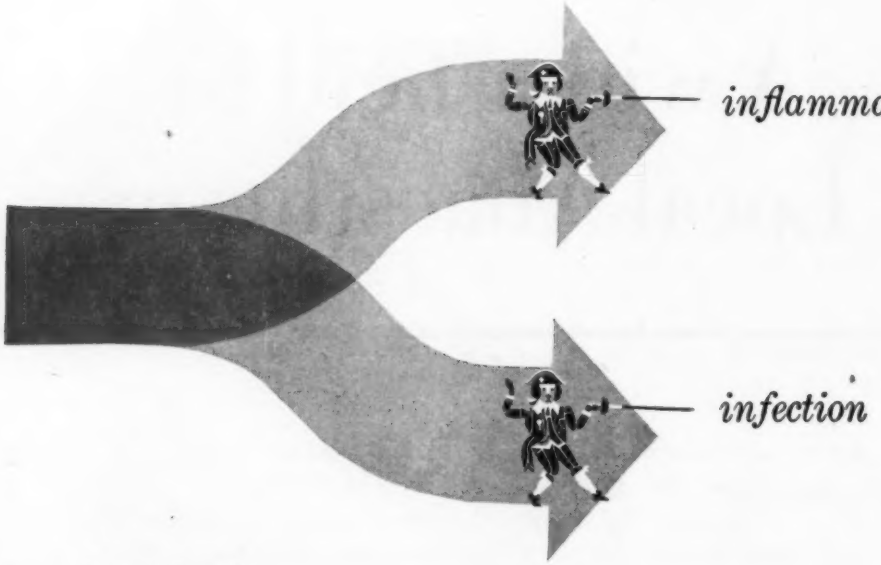

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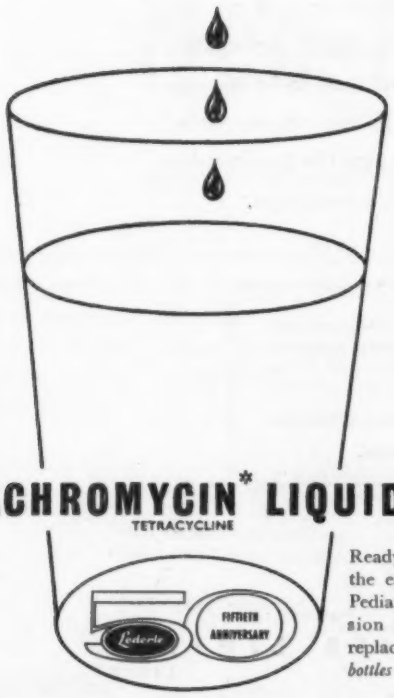

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BYSSINOSIS IN COTTON AND OTHER TEXTILE WORKERS *

R. S. F. SCHILLING
M.D. Lond., M.R.C.P., D.P.H., D.I.H.
READER IN THE NUFFIELD DEPARTMENT OF OCCUPATIONAL HEALTH IN THE UNIVERSITY OF MANCHESTER

"An accurate geography of many diseases is often essential to the complete determination of their true natural history."—GAVIN MILROY, 1879.

FOR over two hundred years textile workers have been known to suffer unduly from a chronic respiratory disease caused by the inhalation of dust. The disease now called byssinosis, from the Greek word βύσσος meaning linen or fine flax, has been described in cotton, flax, and hemp workers. In its early stages it is characterised by a history of chest tightness and breathlessness on Mondays or on the first day at work after an absence. These symptoms may get worse, extending to other working days and eventually giving rise to severe and permanent disability.

Byssinosis in Lancashire

In 1831 Dr. Kay, a physician in Manchester, described cotton spinners' phthisis. This, he said, differed from ordinary chronic bronchitis in that there was a short dry harassing cough which, in the initial stages, ceased immediately the worker left the mill. These symptoms gradually became more severe and eventually continued after employment had ceased. They were accompanied by an obscure sensation of uneasiness beneath the sternum.

In 1861 Sir John Simon, medical officer to the Privy Council, disturbed by the high death-rates from respiratory disease in certain English towns, asked Dr. E. H. Greenhow to ascertain the prevalence and to investigate the causes of pulmonary disease in the cotton towns of Preston and Blackburn. Many of the local doctors attributed the high mortality to the cold climate, the bleak winds, and the sudden changes of temperature in passing to and from homes and factories. In addition mill managers and certifying factory surgeons mentioned the injurious effects of inhaling cotton dust and fibres (Greenhow 1861, 1862, Leach 1863). On the other hand, Arlidge (1892) and Oliver (1908) suggested that the manufacture of cotton was not an unhealthy occupation and that the dust in cotton mills was less in amount and less injurious than dust from flax, jute, and hemp. But the cotton industry was not fully mechanised at that time, particularly in the dusty process of carding.

* Milroy lectures delivered before the Royal College of Physicians of London on Feb. 7 and 9, 1956.

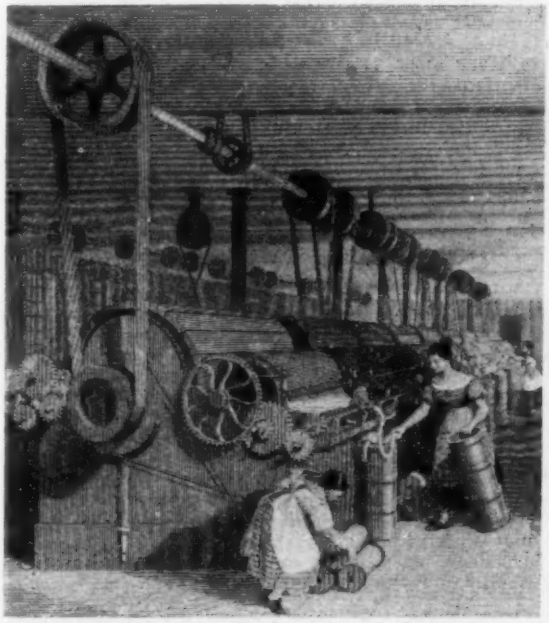

Fig. 1—Enclosed carding engine in use in early 19th century.

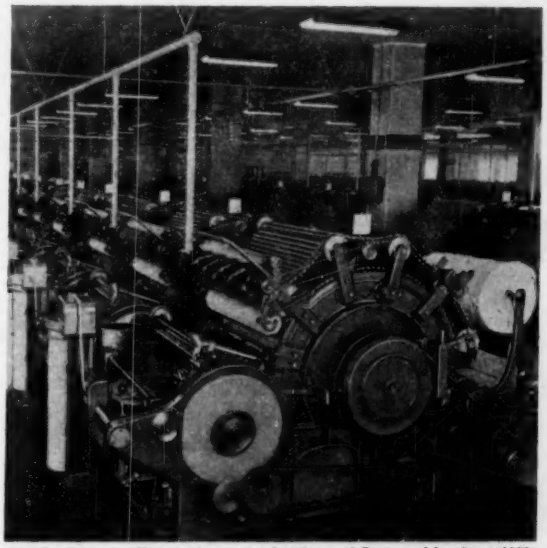

Fig. 2—Open carding engine as used today and first used in about 1890.

The basic principles of carding have not changed since the earliest days of spinning. Bales of cotton are opened in the cotton or mixing room. Dust and short fibres are beaten and blown out of the cotton in the blow room. In the card room the remaining fibres are then combed and straightened by carding, which also removes more dirt and defective material. The fibres are then gathered into a thick strand of cotton, which is drawn out on other machines in the card room into finer strands or rovings ready for spinning.

At the beginning of the 19th century carding was done by a machine consisting of a revolving cylinder with sharp teeth on it and enclosed by fixed wooden strips or flats on which there were teeth opposing those on the cylinder (fig. 1). This machine was superseded by a carding engine called the "roller and clearer," in which the flats consisted of rollers with teeth. They were completely enclosed with large wooden covers. The teeth of the carding engine were cleaned and ground with hand brushes and emery pads by the strippers and grinders. The carding engine with revolving flats, which is used today in mills spinning raw cotton, was introduced into Lancashire in about 1890. It has no cover and consequently must give out considerable quantities of dust (fig. 2). It was then cleaned entirely by a power-driven brush which produced clouds of dust enveloping the strippers and grinders and spreading throughout the card room. As this machine came to be used more and more, conditions undoubtedly became much worse (Home Office 1932).

Some years later Collis (1909) examined 126 strippers and grinders from mills in Blackburn. 93 (74%) had the

characteristic asthmatic complaint on Mondays, and 51 of these were severely affected. He reported that few strippers and grinders stayed at this work for more than twenty years, because it was so damaging to their health. In one mill a method of controlling the dust was used, in which the stripping brush was enclosed and attached to an exhaust system. He thought that, if this principle was used in all mills, the disease would cease to exist. Later Collis (1915) suggested that the disease was in fact rapidly disappearing owing to these improved methods of dust control, and some affected men were able to resume work. By about 1914 the enclosed stripping brush and other exhaust appliances had been installed throughout the trade, and from then the dust from stripping was materially reduced. Dearden (1927) and Legge (1934) referred to the satisfactory way in which the dangerous dust of card rooms had been dealt with.

A Home Office Committee in 1932 concluded, after inquiry, that although dust in card rooms was still a cause of discomfort and ill health, ill effects were not so severe since attempts had been made to control the dust. But the committee found that large amounts of dust were still given off during carding. Prausnitz (1936) suggested that the ventilating and exhaust appliances removed the large but not the fine particles, and in 1939 a Home Office committee on compensation for card-room workers reported that, although byssinosis was still diminishing, there was a continuing problem among card-room and blow-room workers.

MORTALITY AND MORBIDITY STATISTICS

Statistical information about respiratory disease in the 19th century is tenuous. Mortality-rates were calculated by the Registrar-General for cotton workers as a whole, thus making any comparison between the dusty and non-dusty trades impossible.

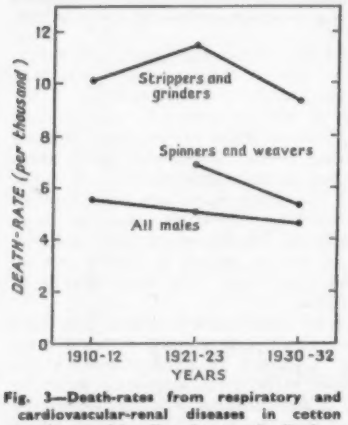

Fig. 3—Death-rates from respiratory and cardiovascular-renal diseases in cotton workers and in all males, standardised on 1921 census population (all males) aged 25–69.

For the triennium 1910–12 and subsequent triennia the Registrar-General has given the death-rates for strippers and grinders separately from other cotton workers. From these data, and others, it is possible to make some assessment of the effectiveness of dust control in the 20th century.

Trends in respiratory mortality over the past fifty years are misleading because myocardial degeneration became increasingly popular as a certified cause of death (Registrar-General 1949). Before 1939 any cardiovascular disease was selected as the cause of death in preference to any respiratory disease where both were mentioned on the same certificate.

Strippers and grinders have always shown high death-rates for cardiovascular-renal disease (Registrar-General 1923, 1927, 1938, Schilling and Goodman 1951). There is little doubt that many of these deaths were primarily due to respiratory disease—e.g., cor pulmonale. Therefore I have taken cardiovascular-renal and respiratory deaths together to assess the possible effects of exposure to dust on mortality. The standardised mortality-rates for strippers and grinders, weavers, spinners, and all occupied males showed that, in 1910–12 and subsequent triennia, strippers' and grinders' death-rates are about twice those of the other groups (fig. 3).†

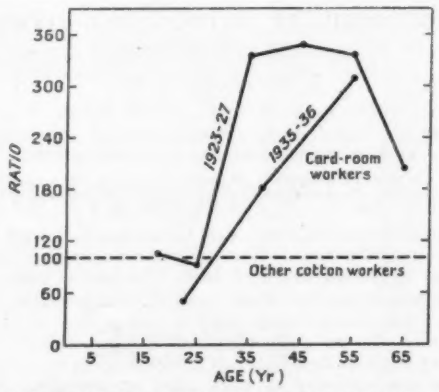

Fig. 4—Male card-room workers' respiratory sickness in 1923–27 (Hill 1930) and 1935–36 (Harvey 1939) in relation to that of other male cotton workers.

Morbidity-rates of Lancashire cotton workers have been studied by Bradford Hill (1930) for 1923–27, and by Harvey (1939) for 1935–36. Both found substantial excesses of respiratory sickness among strippers and grinders and cotton and blow-room workers compared with other male cotton operatives doing less dusty work. Their results for the cotton and blow-room workers supported an earlier suggestion by Collis (1909) that all who prepare cotton for spinning were at risk from byssinosis. Among the women, Bradford Hill found a similar but less substantial excess in the card-room workers compared with the spinners.

Because the excess among the strippers and grinders appeared to be less in 1935–36 than in 1923–27 (fig. 4), the Departmental Committee on Compensation (Home Office 1939) concluded that conditions in the card room had much improved. There are really too many differences between the investigations by Bradford Hill and Harvey to reach such a definite conclusion. For example, Bradford Hill compared the sickness experience of strippers and grinders with that of ring-room workers and warehousemen and excluded sickness absences lasting more than twenty-six weeks. Harvey, on the other hand, compared the sickness experience of the strippers and grinders with that of the spinners and weavers and took all sickness absences into account except those which persisted throughout the two years covered by his study. Although the committee concluded that byssinosis was diminishing, on its recommendation a compensation scheme was initiated in 1941. There are no recent mortality or morbidity statistics for cotton workers. But the reduced risk of byssinosis to be expected from improved control of dust is not reflected in the mortality-rates for 1930–32, and the numbers recently compensated do not indicate that the problem is likely to have diminished to any great extent (see table VI).

CARDIOVASCULAR DISEASE

In 1932 Dr. T. H. C. Stevenson (Home Office 1932) concluded from occupational mortality data that circulatory disease was a more important risk for card-room and blow-room workers than was respiratory disease. As already explained, much of this cardiovascular mortality excess is primarily due to respiratory disease; but, when a

† Since the Registrar-General groups all female textile workers together, the death-rates for women card-room workers cannot be given.

correction is attempted for respiratory deaths allocated to the cardiovascular group of diseases, there is still an excess of cardiovascular deaths for cotton workers, particularly strippers and grinders (Schilling and Goodman 1951).

In 1947, a leading article in the *British Medical Journal*, presumably based on the Registrar-General's mortality-rates, stated that the inhalation of textile dusts was a steady source of deaths from nephritis and a group of conditions whose common factor was hyperpiesis. Further examination of the death-rates for 1930–32 revealed that strippers and grinders aged 55–64 had, compared with cotton workers in less dusty occupations, a significant excess of deaths from cerebrovascular disease, which is likely to be closely related to hyperpiesis (Schilling and Goodman 1951). The proposition that exposure to cotton dust produced hyperpiesis was plausible and an attractive one for research, since it might shed light on the ætiology of cardiovascular disease in middle life, about which so little is known (Morris 1951).

In the first field studies of cardiovascular disease made in 1948–49 in Lancashire cotton mills the strippers and grinders and blow-room workers aged 50–59 were found to have significantly higher blood-pressures than had the weavers (Schilling et al. 1952); but the number who had hypertension was too small to suggest that this was a serious occupational risk.

RESPIRATORY DISEASE

The most important outcome of this particular field study was the finding of a high prevalence of chronic respiratory disease in middle-aged card-room and blow-room workers. Although we had been misled by mortality statistics into a study of cardiovascular disease, it had not been fruitless; it turned our attention to byssinosis, which was generally thought to be a diminishing and unimportant problem in Lancashire.

TABLE I—COMPARISON OF BYSSINOSIS GRADINGS IN 183 COTTON WORKERS

—		Observer A		
	Byssinosis grade	N	I	II
Observer B	N	72	6	..
	I	6	47	17
	II	1	14	20

There is good reason for doubting the reliability of diagnosing byssinosis because it is similar in many respects to non-occupational bronchitis and is often confused with it. Thus in the old compensation scheme (Ministry of National Insurance 1948) awards were only given to the seriously disabled who had spent at least twenty years exposed to the dust.

We have seen that byssinosis is characterised by a history of tightness of the chest on Mondays, but this history is very rarely found in chronic bronchitis or in other industrial pulmonary diseases.

A survey was made in 1953 by Schilling et al. (1955a) in a group of 183 middle-aged men in card rooms and blow rooms to test the reliability of making a diagnosis from the history. Two observers examined each man independently and graded him for byssinosis on his history as follows:

Normal: no chest symptoms.
Grade I: chest tightness and/or breathlessness on Mondays only.
Grade II: chest tightness and/or breathlessness on Mondays and other days.

Two grades of byssinosis were included because it had been noted in previous studies that, as the disease progressed, symptoms appeared to extend beyond Mondays. The gradings were identical in 76% of the 183 men, which is very much more than might be expected by chance (table I). The main source of difference was in the distinction between grades I and II.

TABLE II—COMPARISON OF OBSERVERS' GRADINGS OF TWO MATCHED GROUPS OF CARD-ROOM WORKERS

Observer	Byssinosis grade			
	Normal	I	II	Total
A	58%	28%	14%	156
C	59%	32%	9%	148*

* The numbers examined by the observers are unequal because of absentees and those who left.

In 1955 another card-room population of 304 workers was examined by two doctors, one of whom took part in the survey in 1953. Before the examinations this population was divided into two groups matched for sex, age, and occupation; one group was allocated to each doctor. The results (table II) show that each doctor found similar proportions affected; which is further evidence that the clinical gradings of byssinosis are reliable. In fact the agreement in these surveys is as good as that in classifying radiographs of coal-workers' pneumoconiosis (Fletcher and Oldham 1951). Both radiographs and physical signs of respiratory disease have been shown to be unhelpful in diagnosis (Schilling et al. 1955b).

In the 1953 survey 88 workers from two factories with no known hazard of industrial pulmonary disease were examined as controls: 12 had symptoms of chronic bronchitis, but only 1 mentioned that his breathing was worse on Mondays. Patients with chronic bronchitis may develop chest tightness when exposed to a sufficient concentration of any dust (Oswald et al. 1953). In the early stages of byssinosis the patient is affected only by cotton dust and is worse on Mondays, although card rooms are no dustier on that day (Drummond et al. 1954). The patient may also have no cough and sputum, which are the main symptoms of chronic bronchitis. Therefore the symptom complex in chronic bronchitis is not the same as in byssinosis in its early stages.

The confusion between byssinosis and non-occupational bronchitis and emphysema arises when byssinosis has reached an advanced stage in which the symptoms of breathlessness and tightness of the chest are severe every day. It is often at this stage that the cotton worker goes to his doctor for the first time, complaining of breathlessness accompanied by persistent cough and sputum. In the absence of specific radiographic changes chronic bronchitis is diagnosed. The patient usually remembers that Monday used to be his worst day; but I know 2 men who, when first seen three years ago, gave the typical Monday history but are now so much worse that they do not remember that at one time Monday was their worst day.

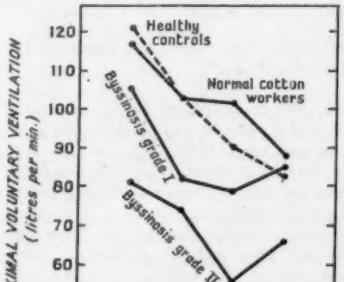

Fig. 5—Mean maximal voluntary ventilation (indirect) of cotton workers and healthy controls.

Thus byssinosis can be diagnosed on the history to

TABLE III—PREVALENCE OF BYSSINOSIS IN CARD-ROOM WORKERS AND SPINNERS AGED 40–59 IN SIX MILLS

Group	Sample					Clinical grading			
	Room	Sex	No.	Mean age (yr.)	Mean exposure (yr.)	Normal	Byssinosis I	Byssinosis II	Total affected (%)
On card engines	C.R.	M	35	48·9	25·3	11	16	8	69
Near card engines	C.R.	F	109	48·8	26·8	58	37	14	47
Distant from card engines	C.R.	F	109	48·4	27·3	84	17	8	23
Mule spinners	S.R.	M	62	49·6	29·0	55	5	2	11
Ring spinners	S.R.	F	61	48·2	28·2	59	1	1	3

C.R., card room. S.R., spinning-room.

enable a reasonably accurate estimate of its prevalence to be made in field studies. The agreement between the clinical gradings of byssinosis and the measurements of respiratory function which will be discussed later (fig. 5) is still further evidence of the reliability of diagnosis.

PREVALENCE IN MIDDLE-AGED WORKERS

In the survey made in 1953 Schilling et al. (1955b) studied the prevalence in mills spinning the coarser grades of raw cotton, which have always had the reputation of being the most dusty. In the Oldham area, which is the main centre of the coarse-spinning trade, there were at that time a hundred and twelve mills working. Twenty-eight were selected because they were the most likely to coöperate. In epidemiological work this method of selection cannot be recommended, but a random sample might well have included mills which could not have coöperated so fully as those selected and would therefore have been unrepresentative. Since similar prevalences were found in two other groups of coarse

TABLE IV—PREVALENCE OF BYSSINOSIS IN MALE CARD-ROOM AND BLOW-ROOM WORKERS AGED 40–59 ACCORDING TO TYPE OF COTTON SPUN

Count	Sample				Clinical grading				
	No.	Mean age (yr.)	Mean exposure (yr.)		Normal	Byssinosis I	Byssinosis II	Total affected (%)	
Fine	51	51·0	28·7	P <0·01	33	14	4	35	P <0·01
Medium	75	49·8	23·1		29	28	18	61	
Coarse	75	49·4	23·3		23	29	23	69	

mills, it seems likely that the rates are reasonably representative of coarse spinning.

Workers aged 40–59, the most likely to be affected, were investigated. First the men in the card rooms and blow rooms were examined, and 115 (61%) of the 190 in the sample were found to have symptoms of byssinosis. Since the prevalence was so high, women in the card room and men and women in the spinning-rooms in six mills were also examined. The results (table III) show an interesting distribution or "geography" of disease. The nearer working groups are to the carding engines the higher is the prevalence of disease. This finding was fairly consistent for each of the six mills and cannot be explained by differences in the ages of the workers or in years of exposure to dust. An obvious deduction was that the carding engines, although cleaned by modern methods, were the main source of the disease—the "Broad Street pumps" in the card room.

The blow-room workers, who had the same high prevalence as the strippers and grinders (Schilling et al. 1955b), are exposed to a different source of dust, which should not be ignored in considering plans for prevention. It was not expected that byssinosis would be found among the spinners, because it had not been previously reported. The spinning-rooms in these mills were separate from the card rooms; so in processing very low-quality cotton fine dust must be emitted from the spinning-frames.

In the more recent investigation in 1955 men in the card rooms and blow rooms of mills spinning finer counts‡ of cotton were examined. The prevalence of byssinosis in these mills was much less than in the mills spinning

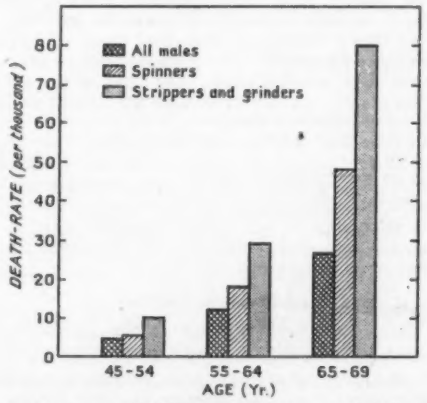

Fig. 6—Death-rates in 1921–23 from respiratory and cardiovascular-renal diseases for strippers and grinders, spinners, and all males. There were similar trends in 1930–32.

medium and coarse counts of cotton (table IV). The significantly longer exposures of the men in the fine-spinning mills suggest that there is less movement of older men out of these mills because of the lower prevalence of respiratory disease.

SEVERITY OF BYSSINOSIS IN MIDDLE-AGED WORKERS

Respiratory disability was assessed in the men in the card rooms and blow rooms of the coarse-spinning mills and in the 88 factory workers (controls) by using a standard questionary to grade dyspnœa and by the measurement of timed vital capacities expressed as the equivalent maximal voluntary ventilation (M.V.V.) in litres a minute: for this purpose a modified Gaensler (1951) apparatus was used. Men were recorded as being seriously disabled if they were unable on their best days

‡ The count is the number of hanks of 840 yards in 1 lb. of cotton: coarse, counts of 1–26; medium, counts of 27–56; fine, counts of 57 or more.

TABLE V—PREVALENCE OF BYSSINOSIS IN CARD-ROOM WORKERS OF ALL AGES IN FINE AND COARSE MILLS

—	Men		Women	
	Fine	Coarse	Fine	Coarse
Diagnosis:				
Normal	59	36	158	143
Byssinosis grade I	2	24	4	66
Byssinosis grade II	1	13	2	22
Not seen or graded	1	3	9	18
Total at risk	63	76	173	249
Percentage of those seen and graded who had byssinosis	5	51	4	38
Mean exposure of those seen (yr.)	13·9	11·1	13·5	13·1

TABLE VI—YEARLY EXAMINATIONS MADE AND CLAIMS AWARDED UNDER BYSSINOSIS COMPENSATION SCHEME

—	1942	1943	1944	1945	1946	1947	1948*	1949†	1950	1951‡	1952	1953	1954	1955
Examinations made ..	7	31	16	30	11	12	14	76	73	80	94	103	114	144
Pensions awarded	3	14	3	10	5	4	11	61	52	46	52	59	73	99

* Women included: women account for about a third of the pensions now awarded.
† Disability reduced to 50%.
‡ Waste industry included.

to keep up with normal men of their own age walking on the level, or if they had an M.V.V. of less than 50 litres a minute.

26 (14%) of the cotton workers were seriously disabled, and 11 of these have since been awarded disability pensions of 50% or more for byssinosis. The proportion of controls seriously disabled with respiratory disease was 4·5%.

Age for age, the average M.V.V. of the men with byssinosis grade I was significantly lower than that of normal cotton workers (fig. 5). Since the tests were not done on Mondays, these results suggest that men with grade-I byssinosis may have permanent disability.

Timed vital capacities were not measured in the other groups of workers, but 12 (5·5%) of the women in the card room were regarded as being seriously disabled because of their breathlessness. None of the 9 spinners who had byssinosis were thought to have any serious disability; but byssinosis among spinners cannot yet be dismissed as an insignificant problem. In 1921–23 and in 1930–32 cotton spinners had higher death-rates than all males from respiratory and cardiovascular-renal diseases (fig. 6). This excess cannot be explained entirely by the fact that they had lived in Lancashire, in which there is a higher death-rate for bronchitis in middle-aged men than in any other county in England and Wales (Schilling and Goodman 1951, Goodman et al. 1953).

PREVALENCE IN WORKERS OF ALL AGES

In the survey made in 1955 every worker in the card room and blow room of two groups of mills was examined. One group of mills was spinning fine and the other coarse counts. The results (table V) show that there is a great difference in the extent of the problem in these two types of mill.

None of the workers in the fine-spinning mills, but 1 man and 1 woman in the coarse mills, were considered to be seriously disabled by byssinosis on the basis of their effort intolerance. It was disquieting to find that in the coarse mills 4 of 16 men, and 3 of 53 women aged less than 40 who had byssinosis were slightly but permanently affected with undue breathlessness on exertion. They were unable on their best days to keep up on hills and stairs with normal people of their own age.

The size of the problem of byssinosis in Lancashire may be gauged roughly by the numbers of pensions awarded. The compensation scheme was initiated in 1941 for totally disabled men who had worked for at least twenty § years in the cotton, blow, and card rooms of mills spinning raw cotton. In July, 1948, women were included. In 1949 the minimum disablement to attract benefit was reduced from 100 to 50%. § In 1951 further regulations gave cover to workers in the waste-cotton industry. ‖ These extensions must account for some of the increase in the yearly numbers in table VI. There have also been two other influences in Lancashire which recently may have stimulated workers to apply more readily for compensation and thus caused an apparent increase in the numbers. The contraction of the industry has probably encouraged those working in mills closing down or on short time to apply for disability pensions. There has also been an increasing awareness of the problem among employers, workers, and trade unions. The certification-rates in general underestimate incidence because they include only seriously disabled workers and because byssinosis is often confused by workers and their doctors with non-occupational bronchitis, which is endemic in Lancashire.

CONCLUSION

Byssinosis is now a serious problem in the Lancashire cotton industry. Is this a recent development, or has byssinosis been overlooked for many years? This type of question in epidemiology is bedevilled by uncertainty about diagnosis and nomenclature (Morris 1955).

The high mortality-rates of the strippers and grinders from 1910 to 1932 and the results of recent field surveys suggest that the problem may not have changed very much. There is not enough evidence to say whether or not the prevalence has increased in the past few years. But many card-room workers say that the mills have recently become dustier because the cotton has contained more plant debris and dirt. This could be explained by the increasing use of mechanical instead of hand picking in the American cotton-fields (Anderson 1954) and a concurrent increase in the use of lower grades and therefore of dirtier raw cotton.

There are several possible reasons why byssinosis has been overlooked and not yet prevented. First, the general population of Lancashire has a high prevalence of chronic bronchitis, with which byssinosis has been confused by doctors and patients. Secondly, it is often thought that byssinosis is not an industrial pulmonary disease because there are no specific radiographic changes in the lung fields. Thirdly, although ventilating and exhaust appliances on the carding engines have cleared the atmosphere of card rooms they have not eliminated the dust which causes byssinosis. Fourthly, byssinosis in Lancashire was regarded as confined to the men, particularly strippers and grinders, for it was not until 1948 that women were included in the compensation scheme. Of the 58,000 workers employed in departments now covered by the compensation scheme about 36,000 are women and girls (Sir Alfred Roberts, personal communication). Byssinosis in women has been obscured by the fact that most of them (57%) in the industry are married (Roberts 1956) and therefore less tied to their trade than are the men. If women get byssinosis they can leave the card room before the disease cripples them.

(To be concluded)

§ In February, 1956, new regulations were made abolishing the 50% disability qualification and reducing the required employment period from twenty to ten years.

‖ In 1948 the Almagamated Association of Card and Blowing Room Operatives claimed that byssinosis was occurring in mills spinning discarded cotton-waste. These mills were said to be less dusty than those spinning raw cotton because their cotton, already cleaned, is processed again by the old type of carding engine, which is enclosed. The waste industry was not included in the Home Office inquiry in 1932 into dust in card rooms. The trade union's claim was confirmed by O'Sullivan and Dingwall-Fordyce (1950), who found that of 140 men aged more than 35 and with at least ten years' exposure 42 (30%) had symptoms of byssinosis, and 7 of these appeared to be seriously disabled.

BLOOD VOLUMES IN GASTRODUODENAL HÆMORRHAGE

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WHEN the decision has been made to operate on a patient with gastroduodenal hæmorrhage, it is important that the patient's blood volume should be restored as nearly as possible to normal before anæsthesia and the operation are started.

It is not always easy to estimate how much blood should be given, because these patients include both young and old, normotensive and hypertensive, and it is difficult to decide how far they have departed from their particular standard of "normality." Grant and Reeve (1951) have clearly demonstrated those clinical signs most valuable as an index of reduced blood volume in war injuries, but so far there has been no parallel investigation in a representative group of patients with bleeding from the alimentary tract.

To this end the blood volume was estimated and relevant clinical manifestations were recorded in patients admitted with acute gastroduodenal hæmorrhage. From the data obtained the clinical findings and their reliability were assessed. Incidental to this main object, control observations of the normal blood volumes in a group of patients who had not lost blood were made and are here reported.

Methods

The methods of estimating the blood volume were the Evans-blue dye (T 1824) technique (Gibson and Evans 1937a) and the radioactive-phosphorus technique (Reeve and Veall 1949, Reeve 1952). These methods are most accurate when used together as complementary observations because the Evans-blue technique directly measures the plasma volume and the radioactive-phosphorus method directly measures the volume of the red cells. The simple addition of these two results gives as accurate a measure of the total blood volume as any known today. Unfortunately the combined method involves a delay of about three hours before the actual sampling is completed; and, if the patient is to be studied in a state unaltered by transfusion, this delay may be undesirable; half of this time is taken up in labelling the patient's red cells with radioactive phosphorus. Moreover the technical laboratory work for each observation involves nearly two days, if preparing and cleaning glassware are included. Thus the method cannot be applied as a routine if a sufficient number of patients are to be examined in a reasonable time. The Evans-blue method, however, can be applied without any delay to an ill patient and will hold up the patient's treatment for less than an hour. Admittedly the volume of the red cells is not actually measured but is estimated indirectly by using the hæmatocrit to give its ratio to the plasma volume.

Comparison of Evans-blue Technique with Combined Evans-blue and Radioactive-phosphorus Method

In a group of 19 patients of widely different ages and of either sex under investigation for uncomplicated peptic ulcer the combined method was used. Thus it was possible to calculate the results from the data of the dye/hæmatocrit method and to compare these with the results from using to best advantage the data from both methods. In 15 cases the total volume was slightly greater when estimated by the dye/hæmatocrit method, and in the remaining 4 it was equal to, or slightly less than, the results obtained from the combined method. Since in both methods the plasma volume is the same measurement by dye, the difference clearly lies in the volume of the red cells. This is a well-recognised phenomenon (Gibson et al. 1947, Reeve 1952) and may be compensated for by applying a hæmatocrit correction factor—f_1 of Reeve (1952)—when the dye method is used. For this group of 19 patients the factor was found to be 0·948, which is slightly greater than that used by most workers.

The same comparison was made in 7 patients seen shortly after acute hæmorrhage from peptic ulceration. In this group a wider difference was apparent, the following hæmatocrit correction factors being obtained: 0·906, 0·901, 1·266, 1·450, 0·998, 0·832, and 1·386. No simple explanation was found for this inconsistency.

Since a consistent hæmatocrit correction factor (f_1) could not be obtained, its use was avoided altogether. Fortunately the total blood volume does not differ greatly whether the dye/hæmatocrit method or the combined dye and phosphorus method is used, because in hæmorrhage cases the volume of the red cells is reduced and variations in it form a relatively small fraction of the total volume. It was concluded that the dye/hæmatocrit method alone was sufficiently accurate to be of value in the present study, particularly because the final interpretation was to be in terms of rather gross volumes—bottles of transfused blood needed.

All results here are expressed on the basis of the dye method alone unless otherwise stated, even if a simultaneous radioactive-phosphorus measurement was made. All hæmatocrit values used have been corrected for trapped plasma by a factor of 0·95 (Barnes et al. 1948) but, for the reasons given above, not corrected for an "over-all body hæmatocrit" (f_1) in any case, normal or abnormal. In this way the results are comparable, all being subject to a similar degree of error.

All hæmoglobin values were measured photo-electrically after dilution with ammonium hydroxide, and plasma-protein levels were measured by the copper-sulphate specific-gravity method (Van Slyke et al. 1950).

Accuracy of Blood-volume Determination after Hæmorrhage

Various workers have reported evidence of stasis of blood in the capillary bed in "shock" (Root and Mann 1942, Chambers et al. 1944, Zweifach et al. 1944, Gibson et al. 1947). In 5 cases of moderate or severe exsanguination evidence of this phenomenon was sought by studying the red-cell volumes before and after transfusion of measured amounts of blood. No increase in the red-cell mass above the amount given, as if due to re-entry of sequestered red cells into the circulation, was observed, although the patients were restored to a clinically normal circulatory state.

This was regarded as additional evidence that there was no serious error in the mixing of the dye (or labelled red cells) used for blood-volume determination in the class of patients examined. Our failure to demonstrate the re-entry of sequestered blood does not disprove this phenomenon, particularly because no patients were examined in extremis and again after resuscitation by transfusion. Clearly a more exhaustive investigation would be required before such a subtle phenomenon could be demonstrated, and this was not our purpose.

Normal Blood Volume

Nomograms relating blood volume to surface area (Du Bois and Du Bois 1916) were prepared from the data obtained by blood-volume estimation in 16 men and 15 women with uncomplicated peptic ulcer. The results were of the same order as those obtained by other workers in healthy people (Gibson and Evans 1937b, Roscoe and Donaldson 1946, Reeve and Veall 1949) and were used in the prediction of normal values in this

series. These normal blood volumes are expressed by the following equations:

For men, $y = 3829x - 1390$, with a residual standard error in y of $\pm$ 466·5.

For women $y = 1869x + 729$ with a residual standard error in y of $\pm$ 404·4.

y = total blood volume in ml., and x = surface area in square metres.

From the same group normal levels for hæmatocrit and plasma-protein levels were determined. The mean values for hæmatocrit (corrected for trapped plasma by a factor of 0·95) were 44·5% for men and 42·6% for women. The mean value for plasma-proteins was 6·84 g. per 100 ml. These values were used as normals in the various calculations referred to below. The predicted normal red-cell volume for any patient was calculated from the appropriate hæmatocrit and the predicted normal total volume mentioned above.

Cases Studied

This report deals particularly with 33 patients with gastroduodenal hæmorrhage who were studied in detail, including one or more blood-volume estimations. These cases were studied regardless of age or sex. At first any case admitted as an emergency with a history of acute melæna or hæmatemesis was accepted for study. Later an increasing effort was made to avoid the less severe states, of which many examples quickly accumulated, and to concentrate on the more severe. Time and opportunity were the only other factors in the selection, and we believe that the results are representative of the group as a whole. Whenever possible, the investigation was made before transfusion, and often it was repeated after further hæmorrhages, after operation, or after recovery, but only one blood-volume estimation (usually the first) for each of the 33 cases is included in the analysis of results. Most of these patients were first seen in the medical wards, and 16 of the 33 were ultimately operated on by me as emergencies because of continued or recurrent bleeding. Many other patients with the same condition were seen during this investigation, and reference is made later to some of these.

In each case clinical observations were made while the blood volume was being estimated. These observations included, as a routine, the rate and volume of the pulse; the blood-pressure; the respiratory rate; the colour and warmth of the face, ears, nose, and hands; the colour of the mucosæ; and the state of the veins of the cubital fossa and the back of the hand and the small veins evident on the back of the ear and the gently stretched eyelid. The colour of the hands was subdivided into the regions of palmar surface, finger pulps, nails, and nail-beds. In addition the capillary refilling time was estimated after blanching by pressure on the ear, fingertips, and nails. The state of the skin, particularly as regards moisture, laxity, and elasticity, was recorded. The tongue was inspected and its state noted. Any other observations that appeared pertinent were recorded forthwith, and it was an inflexible rule to adhere to the written observations and not to succumb to the temptation of reconsidering them once the result of the blood volume was at hand. In other words, the clinical impression made at the bedside and not in retrospect was alone regarded as important. Indeed the results were collected for nearly two years before they were studied to see whether there was a recurring pattern. It was felt that attempts to find correlations as the study proceeded might lead to premature conceptions possibly influencing subconsciously the decision on borderline matters.

Results

Tables I and II summarise the relevant data from the group of 33 hæmorrhage patients. The individual

TABLE I—OBSERVED AND CALCULATED CHANGES IN BLOOD VOLUME AND BLOOD CONSTITUENTS IN 33 PATIENTS WITH GASTRODUODENAL HÆMORRHAGE

a	b	c	d	e	f	g	h	i	j	k	l	m	n
Case no.	Sex	Age (yr.)	Predicted normal total blood volume (ml.)	Total blood volume observed (ml.)	Change in total blood volume (d–e) (ml.)	Hæmatocrit found (corrected) (%)	Predicted red-cell volume (ml.)	Red-cell volume observed (ml.)	Red-cell volume deficiency (h–i) (ml.)	Whole blood lost into gut to give R.C.V. deficiency $\left(j \times \frac{100}{Ht}\right)$ (ml.)	Fluid entering vascular bed to compensate for blood-loss (k–f) (ml.)	Blood lost into gut (% of predicted normal $\frac{k}{d} \times 100$)	Amount of citrated blood transfused (not allowed for in calculation) (ml.)
1	M	30	5430	3950	−1480	21·0	2420	830	1590	3570	2090	65·7	1080
2	M	53	4930	3660	−1270	34·8	2190	1270	920	2070	800	42·0	0
3	F	43	3900	3490	−410	34·2	1660	1195	465	1090	680	28·0	3240
4	F	52	3690	3305	−385	32·4	1570	1070	500	1170	785	31·7	2160
5	F	37	3450	3310	−140	26·9	1470	877	593	1390	1250	40·3	4320
6	M	78	5590	4270	−1320	20·2	2480	860	1620	3640	2320	65·2	4860
7	M	53	5550	5440	−110	21·7	2470	1185	1285	2890	2780	52·1	2160
8	M	66	5050	3538	−1512	31·2	2250	1105	1145	2580	1068	51·1	0
9	M	56	4700	3620	−1080	37·4	2090	1353	737	1660	580	35·4	1080
10	F	38	3100	1930	−1170	23·1	1320	446	874	2050	880	66·1	0
11	M	62	4160	3992	−168	30·8	1850	1233	617	1390	1222	33·4	0
12	M	75	5120	3860	−1260	31·8	2280	1220	1060	2380	1120	46·5	0
13	F	41	4060	3380	−680	23·4	1730	778	952	2240	1560	55·1	540
14	F	52	3860	4020	+160	31·6	1650	1278	372	875	1035	22·7	0
15	F	62	4350	2610	−1740	17·5	1850	440	1410	3310	1570	76·1	0
16	M	70	6450	4580	−1870	14·3	2870	650	2220	5000	3130	77·5	0
17	M	74	4630	4110	−520	21·3	2060	839	1221	2740	2220	59·1	0
18	M	71	5440	4888	−552	34·6	2420	1632	788	1770	1218	32·6	0
19	M	50	5570	3270	−2300	21·0	2480	690	1790	4020	1720	72·2	2790
20	M	23	4980	4190	−790	22·0	2220	925	1295	2910	2120	58·5	0
21	M	54	5350	5840	+490	21·6	2380	1276	1104	2480	2970	46·4	0
22	M	53	6050	5260	−790	28·6	2690	1505	1185	2660	1870	44·0	0
23	M	48	5300	3850	−1450	36·0	2360	1386	974	2190	740	41·4	0
24	M	44	5700	4421	−1279	34·4	2540	1519	1021	2300	1021	40·4	0
25	M	48	4925	4042	−883	41·2	2190	1662	528	1190	307	24·2	0
26	F	36	3850	3400	−450	24·3	1640	825	815	1910	1460	49·6	0
27	F	24	3400	2773	−627	26·0	1450	773	677	1590	963	46·8	4320
28	M	50	5100	4780	−320	36·8	2270	1760	510	1150	830	22·6	3780
29	M	49	5850	4932	−918	25·1	2600	1236	1364	3070	2152	52·5	0
30	F	63	3340	2700	−640	19·3	1420	517	903	2120	1480	63·5	0
31	M	45	6000	3854	−2146	16·1	2670	619	2051	4810	2464	76·9	0
32	M	78	5150	3784	−1366	24·9	2290	942	1348	3030	1664	58·9	3240
33	M	51	5800	4316	−1484	33·2	2580	1436	1144	2570	1086	44·3	2160

Normal hæmatocrit value used (corrected for trapped plasma by ×0·95) { Men 44·5% / Women 42·6% } Taken from control group of uncomplicated peptic ulcer.

Blood-transfusions not allowed for and hence where blood was given all losses are understated by corresponding amount.

All cases presented with acute melæna and/or hæmatemesis.

columns are explained by their headings, and additional explanations are given both here and in a later section (protein mobilisation). In table I column k gives the blood judged to have been lost into the alimentary tract for each case. This has been calculated by finding the difference between the predicted normal red-cell volume (col. h) and the observed red-cell volume (col. i) to give the deficiency in red-cell volume (col. j). This latter deficiency has been converted into a volume of whole blood of hæmatocrit of 44·5% in men and 42·6% in women to give the volume of blood lost (col. k). The normal values found in the control patients with uncomplicated peptic ulcer were presumably close to those of the hæmorrhage patients immediately before their acute episode of bleeding; hence in most cases the assessment of loss should be reasonably accurate. In patients whose blood-loss was superimposed on anæmia serious error arises, but there is no reason to believe that this applies to more than a few patients whose history may have been misleading. This method of calculating the amount of blood lost by use of red-cell deficiency assumes that no significant number of red cells has been replaced since the onset of bleeding, and there is good evidence to support this (E. Topley, personal communication).

It will be seen that many of the patients had lost 2500 ml. or more of blood from the circulation, carrying with it more than 100 g. of protein (table II col. 2). In each case the degree of compensation by hæmodilution and mobilisation of protein is also recorded (table I col. l and table II col. 6). The turnover is striking, and some of these patients have virtually replaced half their blood volume during their episodes of acute hæmorrhage.

TABLE II—OBSERVED AND CALCULATED CHANGES IN PLASMA VOLUME AND PLASMA-PROTEIN LEVEL IN 33 PATIENTS WITH GASTRODUODENAL HÆMORRHAGE

Case no.	1 Plasma lost with blood into gut (table I col. k-j) (ml.)	2 Total proteins lost (col. 1 × 6·84/100) (g.)	3 Predicted normal total proteins (col. 7 × 6·84/100) (g.)	4 Total proteins observed (g.)	5 Change from predicted normal total proteins (col. 4 − col. 3) (g.)	6 Proteins mobilised (col. 2 + col. 5) or (col. 4 − col. 9) (g.)	7 Normal predicted plasma volume (table I col. d − col. h) (ml.)	8 Total plasma volume observed (ml.)	9 Total proteins if none had been replaced (col. 3 − col. 2) (g.)	10 Plasma-protein level if protein mobilisation had not occured (col. 9 × 100/col. 8) (g. per 100 ml.)
1	1980	135	206	154	−52	83	3010	3120	71	2·28
2	1150	78·5	187	147	−40	38·5	2740	2390	108·5	4·54
3	625	42·7	153	141	−12	30·7	2240	2295	110·3	4·81
4	670	45·8	145	130	−15	30·8	2120	2235	99·2	4·44
5	797	54·5	135	160	+25	79·5	1980	2433	80·5	3·31
6	2020	138	212	175	−37	101	3110	3410	74	2·17
7	1605	110	211	239	+28	138	3080	4255	101	2·38
8	1435	98	191	129	−62	36	2800	2433	93	3·83
9	923	63	178	147	−31	32	2610	2267	115	5·07
10	1176	80·4	122	76	−46	34·4	1780	1484	41·6	2·81
11	773	52·8	158	183	+25	77·8	2310	2759	105·2	3·82
12	1320	90·2	194	154	−40	50·2	2840	2640	103·8	3·93
13	1288	88	159	143	−16	72	2330	2602	71	2·73
14	503	34·4	151	197	+46	80·4	2210	2742	116·6	4·25
15	1900	130	171	123	−48	82	2500	2170	41	1·89
16	2780	190	244	216	−28	162	3580	3930	54	1·38
17	1519	104	176	183	+7	111	2570	3271	72	2·20
18	982	67·1	206	189	−17	50·1	3020	3256	138·9	4·26
19	2230	152	211	119	−92	60	3090	2580	59	2·29
20	1615	110	189	167	−22	88	2760	3265	79	2·42
21	1376	94	203	234	+31	125	2970	4564	109	2·39
22	1475	101	230	218	−12	89	3360	3755	129	3·44
23	1216	83	201	148	−53	30	2940	2464	118	4·79
24	1279	87·4	216	174	−42	45·4	3160	2902	128·6	4·42
25	662	45·2	187	167	−20	25·2	2735	2380	141·8	5·95
26	1095	74·9	151	141	−10	64·9	2210	2575	76·1	2·96
27	913	62·4	133	102	−31	31·4	1950	2000	70·6	3·53
28	640	43·7	193	186	−7	36·7	2830	3020	149·3	4·95
29	1706	116	222	252	+30	146	3250	3696	106	2·87
30	1217	83·1	131	127	−4	79·1	1920	2183	47·9	2·19
31	2559	175	228	155	−73	102	3330	3235	53	1·64
32	1682	115	195	151	−44	71	2860	2842	80	2·81
33	1426	97·4	220	162	−58	39·4	3220	2880	122·6	4·26

Normal plasma-protein value used = 6·84 g. per 100 ml. taken from control group of uncomplicated peptic ulcer.

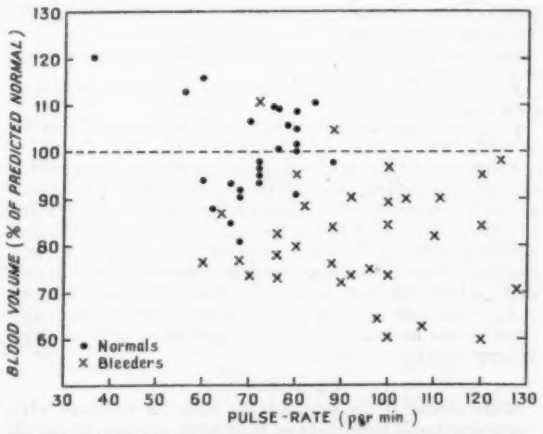

Fig. 1—Relationship of pulse-rate to total blood volume in patients with gastroduodenal hæmorrhage.

Clinical Features

Before the clinical features are analysed, certain modifying factors must be considered. 13 of the patients examined (table I) had received blood-transfusion but they showed few differences in their response to deficiency of blood. This point was carefully checked by marking the transfused cases on the graphs to distinguish them from the untransfused. This, however, has been omitted from the accompanying figures to prevent overcrowding with information. A slight flush on the cheeks was fairly commonly seen after transfusion, but this never concealed the patient's true state. In several cases tachycardia out of proportion to the patient's condition may have been induced by blood-transfusion.

Although many patients had received morphine, the uncertainty of the degree of its effect at the time of examination made it difficult to determine whether morphine modifies the patient's responses to exsanguination. However, as regards the clinical evidence considered here, morphine appeared an unimportant factor. Anæsthesia does, of course, alter the pattern of response considerably; the observations reported were all made in conscious patients. The results are, in most instances, set out in diagrammatic form. In each case the blood volume, as a percentage of the expected normal for the patient concerned, is compared with the clinical observation, and each diagram includes a similar comparison in the control group of healthy people.

Pulse-rate

As fig. 1 shows, the expected trend was found for the pulse-rate to increase as the blood volume fell. 2 patients with pulse-rates of 120 or more had blood volumes near normal. 1 of these patients did not respond to resuscitation and control of the hæmorrhage and was in early "irreversible shock." The other had recently received 4 pints of blood, and the tachycardia may have been a response to this. From fig. 1 it seems that the pulse-rate gives useful positive guidance if it is more than 100 (or even perhaps 90); but if the pulse-rate is less than 80 or even 70 it is not necessarily reassuring. For patients masking a low blood volume by a relatively normal pulse-rate other observations have to be relied on to declare the true state of affairs. The best use of the

pulse-rate is probably as a serial observation indicating the trend of events. Palpation of the pulse proved unreliable in assessing pulse volume, which in any case may be measured by the sphygmomanometer (see below).

Systolic Blood-pressure

In fig. 2 patients found after recovery to be hypertensive have been distinguished from those whose blood-pressure proved to be within the limits of normality (upper limit of normal taken to be 160/90 mm. Hg). There is a clear tendency for the hypertensive patients to be grouped towards one side, indicating that they did not drop their blood-pressure down to the same levels as the normotensive subjects after blood-loss. A case of malignant hypertension bore this out particularly well (this case is additional to the group under study). It is concluded from fig. 2 that, although a systolic blood-pressure below 110 mm. Hg gives useful positive indication of reduced blood volume, one above 120 mm. Hg is by no means reassuring, and other clinical evidence must be used to clarify the true state.

Diastolic Blood-pressure

Whereas the scatter for systolic pressure was fairly wide, a more satisfactory relationship was demonstrated between the diastolic pressure and depletion of blood volume (fig. 3). The hypertensives again stood to one side reluctant to drop their blood-pressures, and the malignant hypertensive was outstanding in this respect. It is concluded that a diastolic blood-pressure above 80 mm. Hg is unlikely to be associated with a drastic fall in blood volume but may be associated with a moderate fall; a diastolic pressure below 65 mm. Hg and certainly below 60 mm. Hg is very likely to be associated with a moderate or severe reduction in blood volume.

Although at times the diastolic blood-pressure is difficult to record, these findings suggest that it is a more valuable guide than the systolic pressure. The diastolic pressure, although most useful evidence in itself, should be considered in conjunction with other evidence.

Pulse Volume

The difference between systolic and diastolic sphygmomanometer readings was compared with blood volume and, as shown in fig. 4, no correlation was found. Measured pulse volume does not appear to be of value in assessing the blood volume.

Hand Pallor

This sign was found to be a valuable index of vasoconstriction under ward conditions. The hands appeared to show the earliest and most reliable response of any part of the body. The assessment of hand colour was taken from a general impression and in particular from the colour of the palmar surface, finger pulps, and nails. A rather weak colour was classed as "fair colour," a definite pallor but yet with a vestige of colour retained was classed as "pallor," but complete absence of any tint was classed as "extreme pallor." In these extreme cases the hands looked bloodless and waxen, with ivory-like nails, while the backs of the hands gave a marbled appearance due to the blue constricted veins contrasting against the colourless skin. The ivory-like appearance of the nail-beds was perhaps the most striking single observation.

"Fair colour" was associated with significant reduction of blood volume (fig. 5). Although "pallor" showed a wide scatter, the great majority of patients had a moderate or severe reduction in blood volume. "Extreme pallor" was seen only in cases associated with a severe reduction in blood volume.

Pallor of the forehead and ears—i.e., scarcely any tint of colour remaining—was only seen in severe reduction of blood volumes, but the hands portrayed this state equally well. It is concluded that hand pallor, as defined above, is usually associated with reduced blood volume, and extreme hand pallor is a clear danger signal, for it indicates a severe reduction in blood volume. Reference is made in a later section to the ominous significance of cyanosis.

State of Veins

In retrospect, after surveying the patients again after blood-transfusion, it was often realised that distinct constriction of the veins had been present at the original observation; but, without knowledge of the patients' normal state, this conclusion had not proved possible.

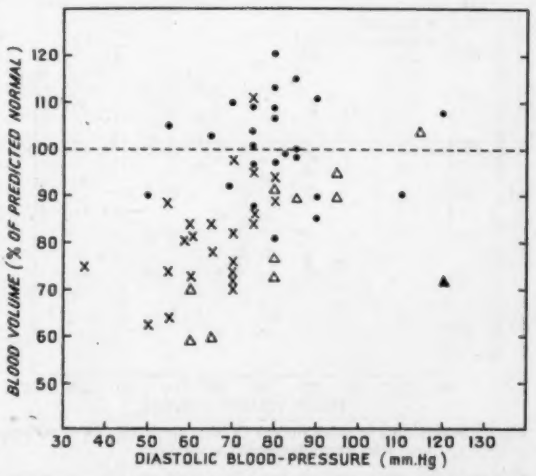

Fig. 3—Relationship of diastolic blood-pressure to total blood volume in patients with gastroduodenal hæmorrhage.

KEY TO FIGURES 2 AND 3.

- • Normals
- × Bleeders
- △ Bleeders known to be hypertensive
- ▲ Bleeder known to have malignant hypertension

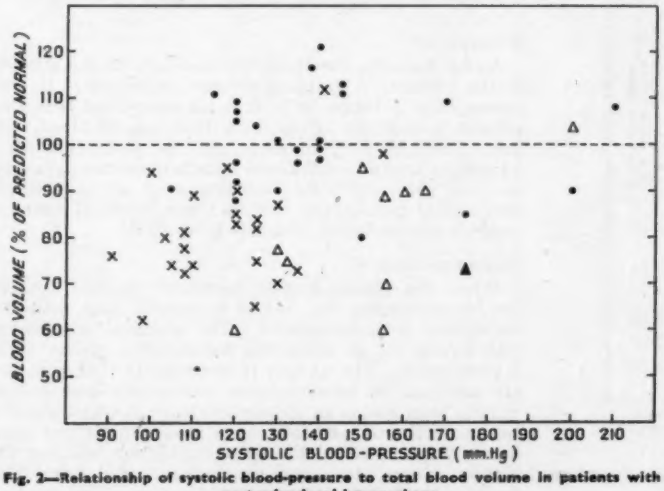

Fig. 2—Relationship of systolic blood-pressure to total blood volume in patients with gastroduodenal hæmorrhage.

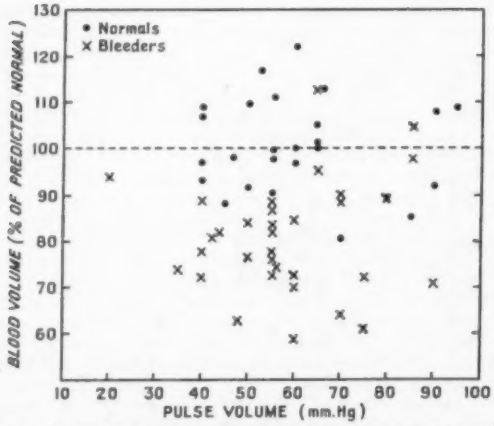

Fig. 4—Relationship of pulse volume to total blood volume in patients with gastroduodenal hæmorrhage.

From fig. 6 it is concluded that really full veins on the back of the hands are seldom seen in the presence of a low blood volume, provided the limb has not been warmed or congested, but large cubital veins may be observed in many patients with moderate or severe reduction, and their presence is not reassuring.

A marbled appearance on the back of the hands or elsewhere—i.e., a pallid skin crossed by thin blue veins in spasm—was seen only in patients with a definite reduction in blood volume and appears to be a useful sign. Of similar significance were the thin red striæ caused by contracted veins against pallid skin on the ears (back or front).

Warmth of Extremities

Cold extremities were seldom seen, but it must be remembered that the patients were examined under reasonably warm conditions. It is concluded from fig. 7 that warm extremities may be seen in even quite serious exsanguination and should not reassure the observer.

Capillary Refilling

The speed of return of colour after blanching a part by pressure was estimated in ears, finger pulps, and nails, and the results for finger pulps are shown in fig. 8. It is concluded that, as a physical sign after hæmorrhage, it gives little real guidance but will arouse suspicion of entry into an "irreversible" state if the hands are somewhat bluish and the capillary refilling is prolonged to over 5 seconds.

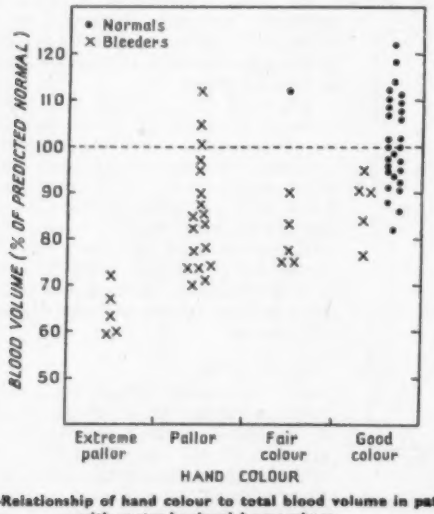

Fig. 5—Relationship of hand colour to total blood volume in patients with gastroduodenal hæmorrhage.

Sweating

This was evident only when the patient was actually bleeding or was in a state of severe deficiency before compensation had taken place. Absence of sweating was noticed in many patients with moderate reductions of blood volume. Sweating appears to be a variable and transitory phenomenon evident at times of distress, and its presence is an important observation, but a dry skin is not necessarily reassuring.

Respiratory Rate

No consistent response in the respiratory rate was observed, and no patient was examined while in a state of air hunger. Presumably, when air hunger is present, there is ample other evidence of blood-volume deficiency. The respiratory rate does not appear to be of any practical help in assessing these patients.

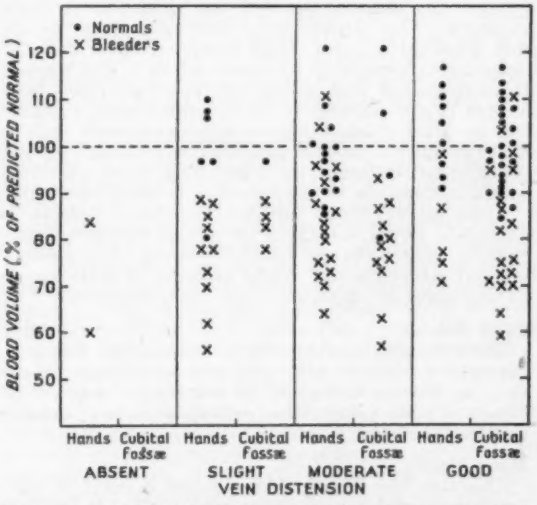

Fig. 6—Relationship of vein distension to total blood volume in patients with gastroduodenal hæmorrhage.

Hæmoglobin

As fig. 9 shows, the lower the hæmoglobin the greater is the chance of a blood-volume deficiency; if the hæmoglobin is below 50%, it is almost certain that the patient is deficient by at least 1000 ml. of blood. A hæmoglobin of 80% or more may be associated with a significant reduction in blood volume in certain patients; so once more the false reassurance of an apparently satisfactory hæmoglobin within a few hours of hæmorrhage is demonstrated (Bennett et al. 1938).

Plasma-proteins

When the plasma-protein levels are plotted against the blood volume (fig. 10), it is evident that a useful correlation is demonstrated. The question arises why this should be so when the hæmoglobin proves such a poor guide. The answer is presumably that proteins are essential to blood-volume restoration, and a low protein level means an incomplete stage of blood-volume compensation. That proteins are rapidly mobilised after hæmorrhage, and indeed are essential for building up blood volume, was readily demonstrated from the figures obtained during this investigation. The correla-

tion between plasma-protein levels and blood-volume restoration appears to be sufficiently important to deserve further consideration.

Importance of Protein Mobilisation

The proteins mobilised in any patient may be estimated roughly from the amount of whole blood lost into the gut (table I col. k) in the following way. By use of the appropriate normal hæmatocrit the plasma content of the whole blood lost is calculated (table II col. 1). If it is assumed that the plasma-protein level is normally 6·84 g. per 100 ml. the approximate total loss of plasma-protein into the gut may be obtained (table II col. 2). If this loss is subtracted from the predicted total plasma-protein level, the amount of protein that would have remained in the blood-stream in the absence of mobilisation of protein is obtained (table II col. 9). The amount of protein mobilised may be calculated by subtracting this latter value from the total protein actually found by experiment (table II col. 6 and fig. 11).

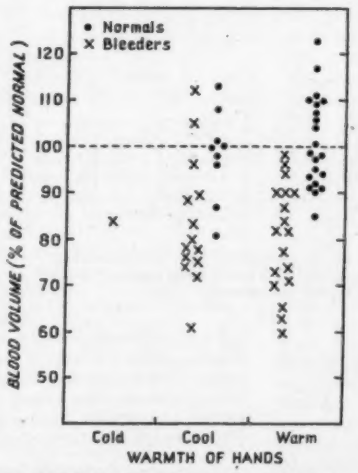

Fig. 7—Relationship of warmth of hands to total blood volume in patients with gastroduodenal hæmorrhage.

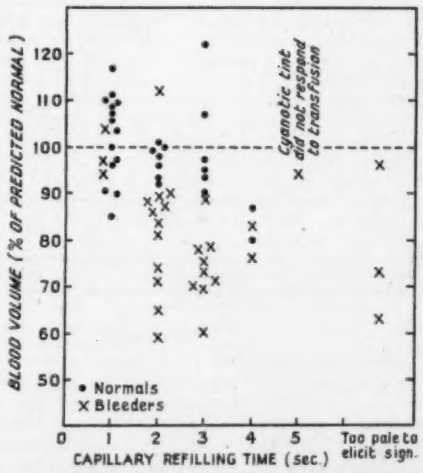

Fig. 8—Relationship of refilling time of finger-pulp capillaries to total blood volume in patients with gastroduodenal hæmorrhage.

Degree of Accuracy

The most serious potential error lies in the accuracy with which the red-cell volume is determined. This value is the basic figure from which the others are derived and is therefore of fundamental importance. As previously explained, the dye method probably overestimates the volume of red cells by up to 10% in healthy people and may well do so in abnormal states. For the reasons already given, a factor was not used to correct this possible error in dye/hæmatocrit method. Fortunately, however, if the correction is made it does not alter the results shown sufficiently to affect the deductions based on them. Moreover other factors operate which tend to make the assessment of protein loss as calculated an underestimate rather than an overestimate.

In most cases it is likely that gastroduodenal hæmorrhage is sufficiently slow to allow appreciable hæmodilution and protein mobilisation while bleeding is taking place, with the result that the blood lost is of changing quality. This does not affect the fact that a unit volume of red cells will be accompanied by the same weight of plasma-proteins regardless of hæmodilution if no allowance is made for addition of proteins by mobilisation. What will vary is the amount of fluid accompanying the red cells, and the figures given have certainly underestimated this; hence in many cases the results of columns k, l, and m in table I should be greatly increased—e.g., if hæmatocrit of 50% is halved, the plasma volume associated with a unit volume of red cells is trebled; if it is halved again, the associated plasma per unit volume of red cells is seven times greater. In addition no allowance has been made for loss of protein mobilised while hæmorrhage proceeds. These considerations suggest that the calculated protein loss is the minimal loss for each case; if this conclusion is justified, further significance is added to the inferences that follow.

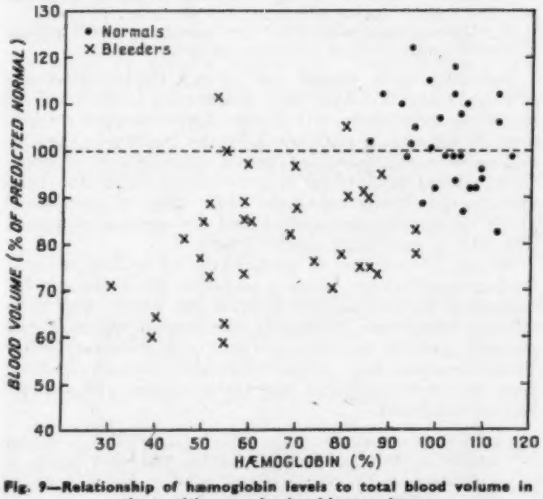

Fig. 9—Relationship of hæmoglobin levels to total blood volume in patients with gastroduodenal hæmorrhage.

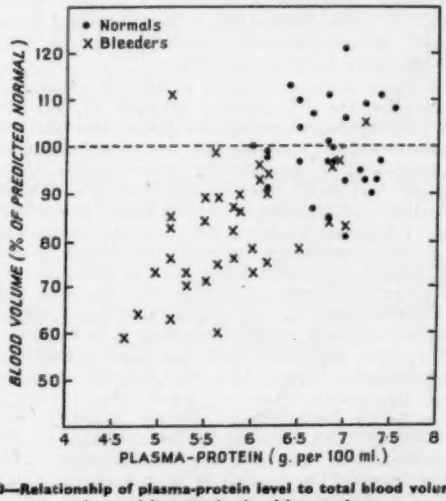

Fig. 10—Relationship of plasma-protein level to total blood volume in patients with gastroduodenal hæmorrhage.

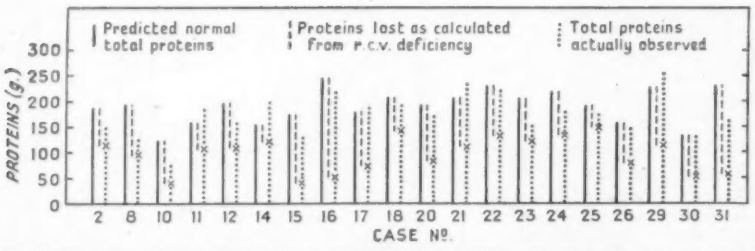

Fig. 11—Diagrammatic presentation illustrating protein loss and its restoration after gastroduodenal hæmorrhage in untransfused patients. In each case the height above the cross marked in the third column represents protein mobilised. For further details see table II.

Conclusions

Cases are presented in tables I and II exactly as observed—i.e., without allowing for any transfusion of blood; but where blood has been given, the appropriate amount is stated. The blood-loss in the latter cases has been in part replaced by the blood transfused, and in this respect all the calculated losses are understated by a corresponding amount. Even if, in some cases, massive hæmorrhage has been partially balanced by transfusion, the body's contribution may still be demonstrated; the replacement figures in all cases represent the mobilisation of body resources and are additional to artificial replacement by any blood that may have been given. However, to avoid confusion, the protein exchanges presented in fig. 11 are confined to untransfused cases. As tables I and II show, the transfused patients in fact, showed results of the same order, and all, in spite of transfusion, had to call extensively on their body reserves. This reasoning was applied to the data available, and, although approximate, the results give the following clear indications:

(1) The amount of protein mobilised was considerable and commonly equal to half that originally present in the circulating blood-plasma (see table II col. 6 and fig. 11).

(2) Unless this protein had been mobilised, the protein remaining distributed in the plasma volume actually found would have been in many cases less than 4 g. per 100 ml. or well below œdema level (table II col. 10). Such low levels of protein could scarcely permit fluid to enter the vascular bed, as it must to compensate for reduced blood volume.

The conclusion is inescapable that protein mobilisation is an essential factor in the compensatory restoration of blood volume after hæmorrhage; without protein mobilisation adequate hæmodilution cannot proceed. Indeed, the term hæmodilution is misleading because, although certain elements of the blood are diluted, others are added in large quantity.

With these considerations in mind it is interesting to speculate on the relationship between plasma-protein levels and the degree of blood-volume restoration after gastroduodenal hæmorrhage (fig. 10). Fluid and electrolytes may well be available to enter the vascular bed owing to their rapid reabsorption from the alimentary tract; hence availability of protein becomes the limiting factor. Thus a protein level of 6 g. per 100 ml. may mean that a patient probably has sufficient protein to restore blood volume, but with 5·5 g. or less per 100 ml. the entry of fluid into the circulation may have gone ahead of the protein mobilisation and is being handicapped by inadequate osmotic pressure, making a full increase of blood volume impossible until the protein mobilisation has proceeded further. This will naturally be greatest during the active phase of blood-volume restoration after a severe hæmorrhage. If the patient's reserves have already been depleted by hæmorrhages or protein starvation, there may be a prolonged drop in blood volume because the patient is in a dangerous state of inability to compensate for hæmorrhage. This seems the best explanation of the tendency to circulatory collapse after operation in a patient who has inadequate protein reserves—e.g., prolonged malnutrition from carcinoma of the œsophagus. Such a patient may not have the protein readily available for blood-volume restoration and hence cannot stand any degree of blood-loss. At operation on such a patient the blood-loss during and after operation must be meticulously replaced if a severe blood-volume insufficiency, for which the body cannot compensate, is to be averted. This is not, perhaps, strictly relevant but is an important line of thought arising from this investigation.

Incidentally, the ready œdema seen when transfusing or on handling the tissues at operation for gastroduodenal hæmorrhage can be explained on the same basis.

Practical Interpretation

One purpose of this investigation was to establish, if possible, practical clinical criteria indicating the degree of blood-volume deficiency in the type of patient involved in the study. In spite of many obvious shortcomings the results appear to justify the formulation of several guiding rules. Perhaps these are best expressed as the minimal requirements that should be met when transfusing before operation for gastroduodenal hæmorrhage. The rules are formulated to apply from the time that the surgeon and the anæsthetist confer on the preparation of the patient. They apply equally well whether or not the patient has received a recent blood-transfusion.

Minimal Requirements

Blood-transfusion is started at the rate of 1 bottle of citrated blood (540 ml.)* every twenty to thirty minutes until the following requirements are met:

(1) The pulse-rate should be brought below 100 per minute.
(2) The blood-pressure should be restored to a systolic of at least 110 mm. Hg and a diastolic of at least 75 mm. Hg.
(3) The hands should be restored to good colour.

Overriding these are two further requirements:

(4) If the plasma-protein level is below 6 g. per 100 ml., then, regardless of other aspects, at least 1 or 2 bottles (540–1080 ml.) of blood should be given. If it is below 5·5 g. per 100 ml. 2 or 3 bottles (1080–1620 ml.) of blood should be given (the lesser figure applies to women and the larger to men).

(5) A hæmoglobin below 50% warrants giving 2 or 3 bottles (1080–1620 ml.) of blood regardless of other factors.

Naturally there should not be any rigidity in these rules but rather a call for very careful consideration before departing from them. It is also apparent that a limit must be set and, if after say 3 bottles (1620 ml.) there is no improvement, the case must be carefully reconsidered. Such critical reappraisal is necessary because the programme of treatment may well require alteration. Table III summarises examples of the various responses observed in personally studied cases.

Failure of response is most likely to be due to continuing hæmorrhage. Such a situation should be met by operating forthwith, under cover of heavy and continuous transfusion, to secure the bleeding-point at the earliest possible moment. There are, however, other possible causes—e.g., diffuse irreversible damage resulting from severe hypotension, and the coexistence of another serious condition.

* Amounts of transfused blood in this paper refer to stored blood as delivered to the patient, and each bottle is composed of 120 ml. of citrate solution and 420 ml. of whole donor blood.

After 3 bottles (1620 ml.) of transfused blood, therefore, the decision has to be made about the nature of the response and, if there has been progressive improvement, whether more blood is required or not. If there has been no improvement, the following questions must be asked :

(1) Is bleeding continuing ? The evidence will be provided, if not by further hæmatemesis, by the unchanged pallor of the skin and the rapid pulse with low blood-pressure. This is a characteristic picture and will seldom leave the observer in doubt ; it is usually an indication for prompt operation with further generous blood-transfusion (table III, cases M and N).

(2) Is the patient in "irreversible shock" ? The term "irreversible shock" is dangerously defeatist although it may sometimes be true. Such a case seen recently (table III, case O) was admitted in extreme exsanguination and showed an unnatural response to transfusion for, although the blood-pressure improved slightly, the pulse-rate remained rapid, and the skin lost its pallor, becoming a dusky cyanosed tint which did not yield to oxygen. With further transfusion the rapid thready pulse and low blood-pressure remained unchanged and the skin became more deeply coloured, indicating peripheral pooling. Finally the extremities became cold and the skin clammy, and no way was found of preventing the decline. The fully coloured skin of dusky tint with the well-filled hand veins clearly distinguished this from continuing hæmorrhage. Apart from pulmonary œdema and dilatation of the right heart necropsy revealed little that might explain the patient's failure to respond to transfusion.

(3) Is the diagnosis wrong or incomplete ? Possibly hæmorrhage is not the fundamental reason for the patient's illness—e.g., uræmic gastritis—or perhaps there is an additional condition—e.g., perforated ulcer and ruptured œsophagus (table III, case P). The opportunity to save the patient may be lost if a careful reassessment is not undertaken and the plan of treatment modified accordingly.

Comparison with Similar Studies in Trauma Patients

It is interesting to compare the results of this study with those in patients with blood-loss from trauma, as in the series reported by Grant and Reeve (1951). The interpretation of the clinical signs is very similar in the two series. The pulse-rate appears to have the same significance in both, but there is a slight difference in blood-pressure. Grant and Reeve found that only 2 of 22 untransfused cases of injury with blood volumes below 70% of normal showed a systolic blood-pressure of over 100 mm. Hg. In our own much smaller series all 4 untransfused patients with blood volumes below 70% of normal showed systolic pressures over 100 mm. Hg ; 2 of these had blood-pressures above 150 mm. Hg, and in both examination after recovery showed their usual systolic blood-pressures to be well above 160 mm. Hg ; the other 2 patients showed systolic blood-pressures of just over 120 mm. Hg and were later shown to be normotensive when in good health. The latter 2 cases probably correspond to the exceptions noted by Grant and Reeve, whereas the former 2 represent the type of response that may be found when examining patients who are hypertensive as a normal state.

Grant and Reeve found that 7 of 21 patients who had received blood-transfusion and whose blood volumes were below 70% showed systolic blood-pressures above 100 mm. Hg, and these workers concluded that transfusion tends to raise the blood-pressure to a higher level relative to blood volume than might be expected from study of untransfused patients. In our series only 2 patients with total blood volumes below 70% had received blood-transfusion ; one of these showed a systolic pressure below 100 mm. Hg, and the other's pressure was 120 mm. Hg. The latter patient was found to be hypertensive after recovery ; therefore it is uncertain whether this is an example of the elevating effect of blood-transfusion upon the blood-pressure relative to the blood volume or is another example of the influence of the normal state of the blood-pressure.

TABLE III—EXAMPLES OF RESPONSES IN TRANSFUSION FOR GASTRODUODENAL HÆMORRHAGE

Case no.	Age (yr.)	Sex	Systolic blood-pressure (mm. Hg)		Diastolic blood-pressure (mm. Hg)		Pulse-rate (per min.)		Hand colour		Amount transfused (ml.)	*Comments* Blood volumes stated when known ; cases do not necessarily appear in table I
			Before transfusion	After transfusion	Before transfusion	After transfusion	Before	After	Before	After		
A	30	M	90	135	50	60	126	100	Pallor	Pallor	1080	Incomplete response because insufficient blood given ; blood volume estimation confirmed this, being only 75% after transfusion
B	51	M	90	105	60	70	108	70	Pallor	Fair colour	2025	Satisfactory response although incomplete ; blood volume showed 75% of normal after transfusion ; more blood desirable ; may have bled after transfusion started
C	43	F	90	120	60	80	95	104	Pallor	Good colour	1620	Satisfactory response although pulse-rate remains high
D	52	M	95	128	50	88	120	102	Pallor	Good colour	1620	Satisfactory response ; blood volume rose from 69 to 100%
E	56	M	100	145	70	80	85	68	Pallor	Fair colour	1620	Satisfactory response
F	62	F	145	170	70	90	100	84	Pallor	Good colour	1620	Satisfactory response ; blood volume rose from 60 to 100%
G	52	F	100	180	70	110	115	90	Extreme pallor	Good colour	2160	Satisfactory response
H	70	M	158	175	60	100	90	80	Pallor	Good colour	2160	Satisfactory response ; blood volume rose from 71 to 100%
I	78	M	90	155	35	75	60	60	Pallor	Good colour	1620	Satisfactory response ; original blood volume 76%
J	23	M	120	120	60	70	88	68	Pallor	Fair colour	1620	Blood volume originally was 84% of normal ; satisfactory response very sallow skin made judgment of colour difficult
K	39	F	60	120	35	70	120	96	Pallor	Good colour	2430	Predicted normal volume was small, 3100 ml. ; transfusion was therefore relatively too large ; patient became œdematous in face and with very distended neck veins ; blood volume rose to 119%
L	24	F	60	110	36	75	138	100	Extreme pallor	Fair colour	2160	Was extremely exsanguinated ; may have been still bleeding ; another 540 ml. of blood brought pulse-rate to 85
M	50	M	110	120	70	60	120	120	Pallor	Pallor	3240	No response because bleeding continued vigorously, shown by repeated hæmatemeses ; immediate operation
N	75	F	120	115	75	75	80	130	Pallor	Pallor	3240	Bleeding continued vigorously ; hence no response to transfusion ; immediate urgent operation ; success ; B.P. normally $\frac{160}{90}$
O	54	M	160	100	?	60	140	120	Pallor	Cyanosis	4320	Brought in moribund ; very poor response to transfusion ; hæmorrhage controlled by operation, but still did not respond at all to resuscitation ; died ; in all 4320 ml. of blood given *after* control of hæmorrhage
P	50	M	95	115	60	90	130	130	Cyanosed but full colour	Cyanosed but full colour	1620	Ruptured œsophagus while vomiting blood ; note incongruous response ; B.P. normally $\frac{170}{115}$

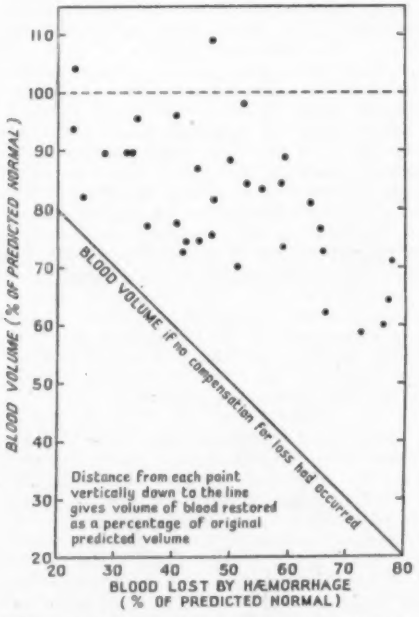

Fig. 12—Calculated volume of blood lost into gut related to blood volume found, showing larger amounts restored with greater losses.

Grant and Reeve do not discuss diastolic blood-pressure, but in our patients this appeared to be an observation of real value.

It is clear, if we compare figures, that the total red-cell deficiency was greater in many of the patients with gastroduodenal hæmorrhage than in the trauma series; yet their physical state, judged by blood-pressure and pulse-rate, was often better—e.g., no cases with a presenting blood-loss of more than 60% are recorded in Grant and Reeve's series, yet there were 11 cases in our series with a loss of more than 60%. Many factors enter into this—e.g., the effects of trauma other than pure hæmorrhage, and the fact that the ulcer patient may bleed intermittently for a day or two rather than by one abrupt heavy loss. At one extreme is the patient with persisting slow bleeding, manifested in melæna, who becomes profoundly anæmic over some days but whose condition otherwise gives little evidence of severe hæmorrhage. At the other extreme is the rapid deterioration of the patient with massive gastroduodenal hæmorrhage and vomiting copiously who has no chance to compensate at a parallel rate. But, whatever the cause, there is little doubt that the patient with intestinal hæmorrhage can tolerate heavier losses better than the patient who bleeds from an injury. The reabsorption of fluid, electrolytes, and perhaps protein offers an easy explanation for this, and it appears that intestinal hæmorrhage must be regarded as a rather special form of blood-loss. Fig. 12 summarises the losses and degree of compensation observed in our cases and demonstrates incidentally that the greater the loss the greater is the amount compensated.

The serum-protein level fell lower in this series than in the injury series; this fact is probably related to the greater losses of blood.

The large amounts of protein mobilised have been demonstrated for the alimentary "bleeder," and comparison with Grant and Reeve's findings suggest that these amounts are greater than those observed with external blood-loss. Thus Grant and Reeve found that, within twelve hours, up to 750 ml. of plasma may be replaced; this contains about 50 g. of protein. In our series the average amount of protein replaced was 70 g., but of course in these cases the precise time of onset is too vague to be certain that this was done within 12 hours. Hence the evidence is inconclusive.

Summary

The accuracy of the Evans-blue (T 1824) dye/hæmatocrit method of estimating the blood volume is compared with the combined results of measurement of plasma volume with T 1824 and the red-cell volume with radioactive phosphorus in patients with uncomplicated peptic ulcer and in patients with acute gastroduodenal hæmorrhage.

The blood volumes of a group of comparatively fit adult patients of different ages under investigation for uncomplicated peptic ulcer were estimated to find the volume to be expected relative to surface area, and the results are presented.

A group of 33 patients of different ages and of either sex with gastroduodenal hæmorrhage were studied. The clinical signs in these patients were related to their blood volumes, and the results are recorded.

It is concluded that the pulse-rate can often give positive guidance if raised, but a slow pulse-rate may give an erroneously favourable impression.

The systolic and diastolic blood-pressures, if low, give positive guidance. In middle-aged and elderly patients the blood-pressure may remain deceptively high, in spite of much reduction in blood volume, because of pre-existing hypertension.

Pallor of the hands indicates a great likelihood of deficient blood volume, extreme pallor making a gross deficiency a certainty.

The value of other easily obtained evidence—e.g. hæmoglobin level, temperature of the extremities, sweating, venospasm, respiratory rate, and return of skin colour after blanching by pressure—is assessed.

The plasma-protein levels bear a definite relationship to depletion of blood volume, and reasons are given to explain why this may be so. Evidence is given of the importance of protein mobilisation in the restoration of blood volume.

A suggested programme of transfusion, based on the above findings, for such patients being prepared for operation, is given. Its application to some cases is recorded to exemplify expected and unexpected responses.

At the inception of this study much advice and encouragement was given by Prof. F. H. Bentley. Dr. E. B. Reeve kindly gave instruction in the methods of blood-volume measurement, setting an inspiring example of logical approach and precision. I am grateful to Prof. F. J. Nattrass for allowing me free access to his patients and to Prof. A. G. R. Lowdon for his valuable criticism.

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THE DIAGNOSIS OF POLIOMYELITIS

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PRIOR to 1949 the diagnosis of poliomyelitis depended upon clinical assessment, supported in special cases by experimental transfer of the infection to monkeys—a costly procedure. The introduction of culture methods for growing poliomyelitis viruses in non-neural tissues (Enders et al. 1949) initiated a new era in investigation; the isolation of virus and the detection of rising antibody levels during the illness was made more practicable, and more accurate diagnosis has now become possible.

The view that poliomyelitis virus is purely neurotropic, as suggested by Flexner (1936) among others, is no longer tenable.

The virus has been found in patients' stools (Harmon 1937) and in various parts of their intestinal tract (Sabin and Ward 1941). In cynomolgus monkeys (German and Trask 1938) and chimpanzees (Bodian 1952) inoculation of virus into the skin of a completely denervated limb induced paralytic poliomyelitis. Virus has been isolated from the blood of orally infected cynomolgus monkeys and chimpanzees (Bodian 1952, Horstmann 1952) and from human blood during the minor-illness phase of infection (Horstmann and McCollum 1953). In monkeys the presence of small amounts of circulating antibody was found by Bodian (1952) to protect against invasion of the central nervous system, and Hammon et al. (1952) reported that in human beings passive immunisation with gamma-globulin afforded protection for a limited period.

Bodian (1952) distinguishes three phases of virus multiplication: (*a*) alimentary, (*b*) reticulo-endothelial with associated viræmia, and (*c*) neural. On this basis there are five possible varieties of clinical poliomyelitis:

1. *Silent infection:* virus in the alimentary phase only.
2. *Abortive poliomyelitis:* virus in both alimentary and viræmic phases. This takes the form of a febrile illness like influenza; in children it may present as an attack of acute tonsillitis and there is often generalised lymphadenopathy; in adults there may be diarrhœa and vomiting. The disease may go no further. This is frequently referred to as the "minor illness" of poliomyelitis. Sporadic cases cannot be diagnosed with certainty, but in times of epidemic prevalence all such illnesses should be regarded as "possible" poliomyelitis. It is worth remembering that true influenza is unusual in the summer months.
3. *Non-paralytic poliomyelitis:* virus in all three phases. After the "minor illness" there is generally a latent period of three or four days in which the patient is quite well; this may be followed by recrudescence of pyrexia with meningeal signs. This second febrile episode, the "major illness" of poliomyelitis, results in a diphasic form of temperature chart, sometimes designated a "dromedary" chart. In non-paralytic poliomyelitis, neuronal damage is insufficient to give rise to clinical weakness, and diagnosis depends on (*a*) the recognition of this classical pattern of infection supported in some cases by cerebrospinal-fluid (C.S.F.) findings characteristic of a virus meningitis, or (*b*) virological methods.
4. *Paralytic poliomyelitis*, similar to (3) but with clinical evidence of flaccid weakness.
5. *Paralytic poliomyelitis of the "neurotropic" variety*, exemplified mainly by post-tonsillectomy poliomyelitis, in which the incubation period is markedly short. Bodian and Howe (1941) have shown that, in the monkey, virus travels along the nerve-path at the rate of 2·4 mm. per hour.

Diagnosis

Preparalytic Phase

At this stage poliomyelitis may be difficult or even impossible to diagnose. During epidemic periods it is wise to regard all cases of pyrexia of unknown origin (especially if accompanied by retention of urine) as possibly attributable to poliomyelitis. Complete rest in bed is essential, because physical activity favours exacerbation of the infection with involvement of the central nervous system. Examination at this time may reveal only equivocal signs of meningeal involvement (e.g., doubtful positive Kernig and Brudzinski signs); neck rigidity is often very slight, and such as may be seen in any infection with meningism. A child is often flushed, apprehensive about being handled, and extremely sensitive to external stimuli. Of the various tests for meningeal irritation, the "tripod" sign is most valuable. To elicit it the patient should be asked to sit upright, unaided, from the supine position. If, in doing this, he holds the spinal column rigid and puts both hands behind him in order to push himself up, he almost certainly has meningeal irritation. Inability to "kiss the knees" without discomfort is further evidence of this condition. A full examination of the cranial nerves and a quick survey of groups of muscles, without undue fatigue of the patient, should then be carried out.

It is axiomatic that, where there is any possibility of bacterial meningitis, lumbar puncture should be carried out as soon as possible. (In this connection it is well to remember that the clinical picture of bacterial meningitis may be greatly modified by indiscriminate or inadequate treatment given before admission to hospital, and in such cases immediate lumbar puncture is indicated so that any doubts may be removed.) In virus meningitis on the other hand the onset is almost always less acute; and little is gained by early examination of the C.S.F. The usual, but by no means invariable, finding of a mild pleocytosis (mainly lymphocytic except in the very early stages when polymorphonuclears may predominate), a slight rise in protein, and normal sugar and chlorides, merely confirms a diagnosis of virus meningitis; it affords no means of differentiating between the many antigenically unrelated viruses that may be responsible. Owing to the possibility of precipitating a paralytic attack by lumbar puncture while the patient is still in the "viræmic" stage of poliomyelitis, we have often deferred this procedure until pyrexia has settled and meningeal signs have abated. At this stage the C.S.F. may show a normal or near-normal cell count; but the protein tends to rise as the cell increase subsides, and it may show significantly increased levels of 50 to 80 mg. per 100 ml., reaching a maximum in 2–3 weeks from the onset. Intramuscular injections of antibiotics or other drugs are usually best omitted because muscle trauma may precipitate a paralytic attack. In any event chemotherapy in any form serves no useful purpose except where there is respiratory insufficiency or secondary bacterial infection.

Rapid return to full physical activity should never be permitted.

Paralytic Phase

The paralytic phase is commonly heralded by tenderness, stretch pain, and fibrillary contractions in muscles, with increase of the deep reflexes. Later, when lower-motor-neurone paresis develops, deep reflexes are diminished or lost, and, with rare exceptions, any sensory phenomena are subjective.

At first it is impossible to assess the likelihood of severe paralysis; neither the severity of the initial symptoms nor the cerebrospinal-fluid findings are any guide. However, the site of the pain and paræsthesia in the initial stage is often the site of the maximum

paralysis. Continuance of the pyrexia indicates activity and a likelihood that paralysis will extend.

Spreading upper-trunk and arm paralysis suggests —and should warn the physician of—the probability of costophrenic respiratory failure. Affection of cranial or upper-cervical nerves should likewise point to possible spread to the 9th, 10th, and 12th cranial nerves, which will produce symptoms of the bulbar type of poliomyelitis, with difficulty in swallowing, dyspnœa, respiratory arrhythmia, and bronchial hypersecretion.

In the acutely ill patient, only a brief examination of groups of muscles is attempted. The patient must not be fatigued with frequent examination.

Differential Diagnosis

Virus Meningo-encephalomyelitis

Many antigenically unrelated viruses may infect the central nervous system, and all may give rise to a symptom-complex similar to that of poliomyelitis. Careful history-taking (emphasising recent contact with infectious disease, occupation, and animal pets, with an exact chronological account of the present illness) may afford valuable clues to the infecting agent.

Mumps may present with meningo-encephalitis without involvement of the parotid or other glands, and virological investigations have shown that this happens more often than has been supposed (Henderson 1952). A history of mumps contact affords good ground for virological investigation, by which means alone the diagnosis can be confirmed.

Lymphocytic choriomeningitis.—Infection with L.C.M. virus cannot be definitely distinguished without virological investigation, but a high pleocytosis in the C.S.F. is suggestive; counts above 450 cells per c.mm. are seldom encountered in poliomyelitis, but in L.C.M. counts of this level or much higher are the rule.

Herpes simplex, herpes zoster, infectious mononucleosis, infectious hepatitis, influenza, and ornithosis may all give rise to a picture distinguishable from non-paralytic poliomyelitis only by virological studies. Routine blood-counts may, however, show the typical abnormal monocytes of infectious mononucleosis.

Morbilli, rubella, varicella, and variola may cause meningo-encephalomyelitis, either during the pre-eruptive or post-eruptive periods (McMath 1954), but the rash or history thereof will show the nature of the infection.

Coxsackie virus.—The full extent of infection with Coxsackie viruses in man is not yet known. One manifestation may be a benign virus meningitis. This may perhaps be distinguished by a significant rise in antibody titre to the active pathogen, since the two viruses are sometimes found in the stools of the same patient.

Infections of uncertain origin.—Outbreaks of encephalomyelitis probably of virus origin have been reported from Adelaide (Pellew 1951), Coventry (Macrae and Galpine 1954), New York (White and Burtch 1954), London (Acheson 1954), Durban (Cheetham 1955), London (*Lancet* 1955), and North-west London (Ramsay and O'Sullivan 1956). No ætiological agent was detected, but the general picture and the results of investigation showed that a diagnosis of poliomyelitis was untenable. The clinical features which first suggest a diagnosis other than poliomyelitis are: pareses unaccompanied by wasting; tendon reflexes unaffected or often exaggerated; and objective sensory phenomena. The finding of a normal C.S.F., and electromyographic studies which do not show any evidence of neuronal degeneration, complete the distinction from poliomyelitis. Sequelæ, in the form of proneness to physical and mental fatigue, behaviour changes, and emotional instability, have been a feature of many cases.

Prophylactics

It is well known that the agents used in prophylaxis against smallpox, rabies, pertussis, and diphtheria may cause encephalopathy.

Bacterial Meningitis

Tuberculous meningitis usually presents in a subacute form. A history of ill health for some weeks or months suggests the possibility of a tuberculous infection, in which case headache persists and the patient becomes mentally confused. Lumbar puncture generally affords distinctive evidence: a C.S.F. with a mainly monocytic pleocytosis and a sugar level under 40 mg. per 100 ml. is probably the result of tuberculous infection, and if the sugar is below 30 mg. the diagnosis is almost certain. The bacilli may be seen in the centrifugalised deposit of the C.S.F.

Pyogenic meningitis.—The classical picture of bacterial meningitis seldom presents any difficulty in diagnosis save in an infant, or in an adult who has had partial and inadequate chemotherapy before admission to hospital, when the clinical picture may be so modified that a bacterial infection is not suspected. In such cases early lumbar puncture is essential. In the classical case of bacterial meningitis, the sudden onset, the development of toxæmia, and the almost intolerable headache indicate something more severe than a virus meningitis. A petechial or purpuric rash and an enlarged spleen are almost pathognomonic of meningococcal infection. The finding of mainly intracellular gram-negative diplococci in the C.S.F., with an increase of polymorph cells and a decrease or absence of sugar, clinches the diagnosis. If the organism cannot be seen in the film of the C.S.F., diagnosis can be confirmed only by its culture from the C.S.F. and/or blood.

Leptospirosis

Leptospira canicola infection, derived from dogs, often presents with encephalitis simulating poliomyelitis (Ramsay 1955). *L. icterohæmorrhagiæ*, derived from rats, may do likewise. Suffusion of the eyes and albuminuria are two valuable signs; inquiry as to occupation, animal pets, and contact with rat-infested sewers or pools is a safeguard against misdiagnosis. The organism may be isolated from the blood in the 1st week of the illness and from fresh alkaline urine between the 10th and 30th day. Demonstration of a significant rise in antibody titre affords equally convincing proof, and is the usual means of diagnosis.

Polyneuritis and Radiculoneuritis

Radiculoneuritis (Guillain-Barré syndrome) tends to have a gradual onset; there is a symmetrical diffuse paresis, often with both subjective and objective sensory changes. The C.S.F. is distinctive in that it shows an early marked cell-protein dissociation, the cells being low or absent and the protein high (e.g., 300–400 mg. per 100 ml.).

Diphtheritic polyneuritis commonly begins with palatal and ocular pareses, which should lead one to inquire for a history of sore throat.

Toxic polyneuritis (e.g., from lead, arsenic, or alcohol) has a more gradual onset with sensory changes.

Cerebral Accident

Cerebral hæmorrhage, with its usually but not invariably sudden onset, may show localising signs and evidence of increased intracranial pressure, whilst rupture into a ventricle or subarachnoid hæmorrhage cause blood to be freely mixed with C.S.F.

Spinal-cord Lesions

Lesions of the spinal cord may be nutritional, malignant, or hereditary. A careful family history, a past history, and an account of the present illness—often presenting pyramidal signs, sphincter disturbances, and objective sensory signs—is essential for accuracy in diagnosis.

Hysteria

Hysteria is not uncommon during epidemics, especially after injections, falls, &c. The patient's manner and/or behaviour is indicative of such a state. Examination of the affected limb(s) reveals that flexor and extensor muscles contract simultaneously. Reflexes are brisk,

and (in the case of an upper limb) the patient commonly flexes the wrist on shaking hands.

Other Conditions

Rheumatic fever, arthritis, myalgia, osteomyelitis, scurvy, syphilis, and injury may all present with pseudoparesis; but a full physical examination should determine the nature of the lesion. Botulism causes digestive disturbances and cranial-nerve palsies. Trichinosis presents with diarrhœa followed by tenderness of muscles and œdema of the eyelids, and may be confirmed by muscle biopsy (commonly of the deltoid muscle).

Laboratory Diagnosis

Laboratory investigations may confirm or refute a diagnosis. In poliomyelitis the tests used consist in (1) attempted isolation of the virus; and (2) demonstration of increased antibody titres. In paralytic illness they are useful because they show which type of poliomyelitis virus is responsible, which may be of epidemiological importance. In the non-paralytic or abortive forms of illness they help in differentiation between poliomyelitis and other infections. But the results of tests are seldom available for several days after specimens are received.

After infection, poliomyelitis viruses multiply in, and are excreted from, the alimentary tract for a length of time which depends on the type of virus, and also varies from person to person. The chance of recovering the virus is greatest if specimens of fæces are obtained during the acute stage of illness. According to Kibrick et al. (1955) virus may be isolated from over 95% of paralytic cases during the first fortnight of illness. For isolation, bacteria-free fæcal suspensions are inoculated into tissue-culture tubes containing a sheet (previously grown) of susceptible epithelial cells. Virus from the suspension will invade and multiply in the cells, eventually destroying them and producing the so-called cytopathogenic effect, recognisable on microscopy. This effect, depending on virus multiplication, varies in its time of appearance according to the amount of virus in the original inoculum, and does not appear if this contained no virus. Once a virus is isolated, its type may be determined from the knowledge that only a type-specific antiserum will inhibit a virus invasion of susceptible cells and therefore prevent the appearance of the cytopathogenic effect—i.e., only one of the three type-specific antisera will inhibit multiplication of a particular poliomyelitis virus.

A similar method of identification may be used to identify other viruses isolated in tissue-culture.

As the serological tests, both neutralisation and complement-fixation, depend on demonstration of a fourfold or greater rise in antibody titre during the illness, a significant result is obtainable only in convalescence. The neutralisation test, although useful, is very cumbersome, and its use on a large scale is difficult. Its disadvantages are (1) that, owing to the diphasic nature of poliomyelitis, quite a high antibody level may be present at the time of onset of paralysis or meningitis, so that a further clear-cut rise may not be obtained; and (2) that neutralising antibody from previous infections may persist and cloud the picture—though in this case the levels usually remain unchanged in successive specimens of serum. The complement-fixation test has not been widely used in this country, but appears to be a valuable indicator of recent infection. The fact that results seem more specific if live virus antigens are used is a disadvantage for routine purposes. Again, although the antibodies are less persistent than are neutralising antibodies, past infections may obscure the results

In the differentiation of non-paralytic or abortive forms of illness, serological tests for other viruses or organisms (e.g., mumps, lymphocytic choriomeningitis, psittacosis, influenza, herpes simplex, and leptospiral infection) are undertaken in many public-health laboratories. The same criteria with regard to the taking of samples of serum apply in these tests, and because of the number of tests it is essential that adequate amounts of serum should be provided.

Although the laboratory investigation of poliomyelitis is at present restricted to a small number of laboratories, the development of tissue-culture techniques means that aid in diagnosis should soon be more freely available.

Retrospective Diagnosis of Poliomyelitis

The sequelæ of poliomyelitis may be confused with congenital and other weakness and deformities. Poliomyelitis tends to cause vasomotor changes, whereas the muscular dystrophies show a selectivity of proximal parts of limbs, perhaps accompanied by pseudohypertrophy. In muscular dystrophy the signs are symmetrical and the electrical reactions differ from those obtained in muscle-wasting following denervation.

Residual respiratory paresis, with its impaired respiratory ventilation, patchy collapse of lungs, and tendency to respiratory invalidism, might well be confused with chronic bronchitis and/or bronchiectasis.

Summary

The diagnosis of poliomyelitis may be problematical. There are many causes of headache, of meningeal irritation, of cranial and spinal nerve palsies perhaps causing difficulty in swallowing and in breathing, and of a cerebrospinal fluid with pleocytosis and a normal glucose content—all of which must be carefully considered in coming to a diagnosis.

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HYPOTHYROIDISM

ITS ÆTIOLOGY AND RELATION TO HYPOMETABOLISM, HYPERCHOLESTEROLÆMIA, AND INCREASE IN BODY-WEIGHT

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IN the seventy-nine months between January, 1946, and June, 1952, the basal metabolic rate (B.M.R.) of more than 10,000 patients of the Middlesex Hospital was estimated at the Courtauld Institute. Of this total, 227 were found to be hypometabolic—i.e., they had a B.M.R. below −25% (Aub and du Bois 1917), estimated by the technique of Robertson (1944)—and 119 of these were clinically hypothyroid; and the records of the hospital during the same period contain notes of 21 other clinically hypothyroid patients whose B.M.R. was either not estimated or was above −25%. Thus we have a total of 140 cases of clinical hypothyroidism for analysis.

Ætiology of Hypometabolism

Table I classifies the hypometabolic patients by sex and diagnosis. Patients with primary hypothyroidism are considered separately in later sections. The 20 hypometabolic patients on whom no definite diagnosis was possible have been omitted from the remainder of the survey.

It will be seen that pituitary deficiency (principally by causing secondary hypothyroidism) is an important cause of hypometabolism, which may also be associated with miscellaneous endocrine deficiencies and with simple obesity. Severe hypometabolism (B.M.R. less than −35%) was seen only in pituitary deficiency. During the period of investigation the B.M.R. was estimated in 6 patients with Addison's disease and was always above −20%.

Ætiology of Hypothyroidism

It is believed that all the hypothyroid patients who attended the Middlesex Hospital during this period, either as inpatients or outpatients, have been included; but it is of course not possible to assess the number of cases of hypothyroidism that either remain undiagnosed or are diagnosed and treated without attending a hospital.

TABLE I—CLASSIFICATION OF HYPOMETABOLIC PATIENTS

Diagnosis	Male	Female	Total
Primary hypothyroidism	21	98	119
Other diseases:			
Disorders of thyroid gland (1 Hashimoto's disease, 1 Riedel's disease, 1 colloid goitre)	0	3	3
Routine follow-up after thyroidectomy (without any clinical signs of hypothyroidism)	1	10	11
Panhypopituitarism	8	8	16
Pituitary hypothyroidism	2	3	5
Anorexia nervosa	0	6	6
Amenorrhœa of unknown cause	..	5	5
Eunuchism or eunuchoidism	3	..	3
Menopausal symptoms	..	7	7
Simple obesity	6	11	17
Other diseases with no apparent metabolic disturbance	4	11	15
Definite diagnosis not possible, because case-records lost or incomplete	7	13	20
Total	52	175	227

Table II classifies the hypothyroid patients by sex and ætiology.

Idiopathic Hypothyroidism

Under this heading are grouped all the patients (including cretins) whose hypothyroidism was of unknown ætiology.

Table III classifies these patients by sex and age of onset of the main symptoms. There was usually an interval of one or two years between the onset of symptoms and the recognition of hypothyroidism.

The sex-incidence in this series was 86% women to 14% men. This figure is in agreement with other published series. The classical report on myxœdema of a committee of the Clinical Society of London (1888) also found 86% women to 14% men (109 cases). Means (1948) cites two series in which the proportion of female patients was 82% and 78%; and 86% of 151 hypothyroid patients cited by Burnstein (1948) were women.

TABLE II—ÆTIOLOGICAL CLASSIFICATION OF PRIMARY HYPOTHYROID PATIENTS

Ætiological diagnosis	Male	Female	Total
Idiopathic in infants (cretins)	2	0	2
,, in juveniles and adults	13	78	91
Following thyroidectomy	4	27	31
Following known previous disease of thyroid gland	0	3	3
Following treatment with either thiouracil or methyl thiouracil	2	2	4
Following irradiation of neck	0	6	6
Following ^{131}I therapy	2	1	3
Total	23	117	140

TABLE III—CLASSIFICATION OF IDIOPATHIC HYPOTHYROID PATIENTS BY SEX AND AGE AT ONSET

Age at onset (yr.)	Male	Female	Total
0 (cretins)	2	0	2
0–9	0	3	3
10–19	0	1	1
20–29	1	6	7
30–39	2	8	10
40–49	5	22	27
50–59	3	25	28
60–69	1	9	10
70–79	0	1	1
Unknown	1	3	4
Total	15	78	93

The onset of symptoms, commonest between the ages of 40 and 60, had a mean at 45 years. The same age-distribution was found in the Clinical Society of London's (1888) report; and in Burnstein's (1948) series the average age of onset was about 30.

Idiopathic hypothyroidism is not rare. In the period under review, out of 59,000 inpatient admissions to the Middlesex Hospital, 39 were for idiopathic hypothyroidism—a hospital incidence of 0·07%. In Weinstein's (1932) series, of 37,000 patients admitted, 22 had myxœdema—an incidence of 0·06%. At his own hospital Means (1948) found an incidence of 0·08%. It is remarkable that there should be so close a similarity in sex-incidence and incidence among hospital admissions in different series of hypothyroid patients drawn from different centres at different periods. All these patients, however, were of similar racial types, and I have not been able to find any reported incidences of idiopathic hypothyroidism in either Asian or African populations.

Hypothyroidism following Thyroidectomy

752 thyroidectomies were performed at the Middlesex Hospital in this period. 19 cases of hypothyroidism followed subtotal thyroidectomy done for toxic goitre, and 12 followed operations for non-toxic diseases of the thyroid gland. Thyroid treatment was not given post-operatively unless hypothyroidism developed (Vaughan Hudson, personal communication).

Table IV shows the incidence of postoperative hypothyroidism to be 4%, an incidence independent of sex ($\chi^2 = 0·0003$, $P > 0·95$). Thus a woman is no more likely than a man to become hypothyroid after operation, though her chances of developing idiopathic hypothyroidism are so much greater. Bartels (1953), reporting postoperative hypothyroidism with an incidence of 7%, also found this to be independent of sex. In the 5000 operations of Cattell and Morgan (1939) the incidence of postoperative hypothyroidism was also 4%.

TABLE IV—CLASSIFICATION OF THYROIDECTOMIES BY SEX AND RESULT

—	Male	Female	Total
Postoperative hypothyroidism	4	27	31
Postoperative asymptomatic	106	615	721
Total	110	642	752

Table V shows that there is no apparent difference in the incidence of hypothyroidism following thyroidectomy for toxic and for non-toxic disease of the thyroid gland ($\chi^2 = 0·2$, $P = 0·6$). There also seemed to be no difference in the distribution of lymphatic tissue in the thyroid glands between those patients with thyrotoxicosis who developed postoperative hypothyroidism and those who did not (D. N. Baron and F. C. Chesterman, unpublished work). Levitt (1952) divides the incidence of postoperative hypothyroidism according to the initial lymphoid state of the gland.

Hypothyroidism following Known Previous Thyroid Disease

Hypothyroidism has been described following acute or chronic thyroiditis or (rarely) a "burnt-out" toxic goitre (Means 1948) and in cases of endemic goitre (Hubble 1953). Of the 3 cases in the present series 2 followed acute thyroiditis and 1 developed fifteen years after successful treatment of Graves's disease with iodine.

Hypothyroidism following Anti-thyroid Drugs

In 1 patient with angina pectoris the hypothyroidism was intentional; in the 3 other patients, with Graves's disease, it was due to imperfect control of treatment.

Hypothyroidism following Irradiation of Neck

Hypothyroidism was not unexpected in 5 of the 6 cases, because the X rays were directed at the thyroid gland for the treatment of Hashimoto's disease (1 case), Riedel's disease (1 case), and thyrotoxicosis (13 cases). In the 6th case, however, the hypothyroidism was a complication of irradiation of the whole neck:

In 1947, when the patient was aged 46, irradiation of her neck was begun for tuberculous cervical adenitis. 700r at 220 kV was applied in a six-week course in 1947, and again in 1949 and 1951. Hypothyroidism (B.M.R. −27%) developed after the last course (2100r having been given), and the patient has been maintained on thyroid extract ever since. [Hospital no. 32649.]

TABLE V—CLASSIFICATION OF THYROIDECTOMIES BY INITIAL DISEASE AND RESULT

—	Thyrotoxicosis	Non-toxic disease of thyroid gland	Total
Postoperative hypothyroid ..	19	11	30*
Postoperative asymptomatic	415	306	721
Total	434	317	751*

* The difference between these totals and those in tables II and IV is accounted for by 1 patient whose initial disease of the thyroid gland was unknown.

I have not been able to find any published report of hypothyroidism caused by irradiation of the neck for a disease other than one affecting the thyroid gland. Una Ledingham (personal communication) has recently seen another patient in whom hypothyroidism followed irradiation of a carcinoma of the larynx.

Hypothyroidism following Treatment with ^{131}I

In the period of investigation, 26 patients were treated with ^{131}I at the Middlesex Hospital for carcinoma of the thyroid gland, thyrotoxicosis, or heart-disease. The hypothyroidism of 3 of these patients (12%) followed doses of 25 mc for angina pectoris, 200 mc for carcinoma of the thyroid gland, and 90 mc for carcinoma of the thyroid gland. Crile and McCullagh (1951) found 8 cases of hypothyroidism in 73 cases of thyrotoxicosis (11%) treated with ^{131}I, and McGavack (1953) reported an incidence of transient hypothyroidism in 12% of cases of hyperthyroidism treated with ^{131}I.

Basal Metabolic Rate in Hypothyroidism

Table VI shows the distribution of B.M.R. in this series, classified by sex and into idiopathic hypothyroidism and hypothyroidism from other causes. (In 4 patients the B.M.R. was not estimated.) Most of the patients had a B.M.R. between −25% and −35%, and the mean B.M.R. was −30·6%.

The range of B.M.R. levels is similar in men and women. In idiopathic hypothyroidism the average is lower (mean −31·6%, standard deviation (S.D.) ± 6·9%) than in other hypothyroidism, caused by an external agent (mean −28·3%, S.D. ± 7·5%). Statistical comparison of these means shows $t = 2·7$, $P = 0·01$. An explanation for this discrepancy can be offered. Patients with idiopathic hypothyroidism do not visit their doctor until the disease is advanced, whereas patients who have been submitted to thyroidectomy or to other causes of hypothyroidism are carefully observed, and any hypothyroidism which may develop is recognised earlier.

TABLE VI—BASAL METABOLIC RATES IN PRIMARY HYPOTHYROIDISM

B.M.R. (%)	Idiopathic hypothyroid	Other hypothyroid	All hypothyroid		
			Total	Male	Female
−5 to −9	1	0	1	0	1
−10 to −14	1	0	1	0	1
−15 to −19	2	1	3	0	3
−20 to −24	7	5	12	1	11
−25 to −29	25	19	44	7	37
−30 to −34	32	14	46	5	41
−35 to −39	12	3	15	5	10
−40 to −44	8	2	10	3	7
−45 to −49	2	1	3	1	2
−50 to −54	1	0	1	0	1
Total	91	45	136	22	114

It is important to realise that clinical hypothyroidism can occur with a normal B.M.R.: in this series 5 patients (3%) had a normal B.M.R. (above −20%) and 12 others (8%) had a B.M.R. within the doubtful range (from −20% to −25%). Detailed comparison with other series has little value because of the different techniques and standards used; but Hurxthal (1945) states that 2 out of 100 patients with myxœdema may have a normal B.M.R.

Plasma-cholesterol Level in Hypothyroidism

The plasma (or serum) cholesterol level was estimated in 65 hypothyroid patients. (The mean B.M.R. of the patients whose plasma-cholesterol levels were estimated was −30·5%, S.D. ± 7·1%; and the mean B.M.R. of the other patients was −30·6%, S.D. ± 7·8%: thus there is no evidence that the patients whose plasma-cholesterol levels were estimated were not representative of all the cases.) In our hands the normal range was 140–260 mg. of cholesterol per 100 ml. of plasma (by a modification of the method of Schoenheimer and Sperry [1934]). The mean plasma-cholesterol level of the hypothyroid patients was 398 mg. per 100 ml., S.D. ± 122 mg. per 100 ml.

Fig. 1 shows the distribution of plasma-cholesterol levels in relation to the patients' B.M.R. It is now generally

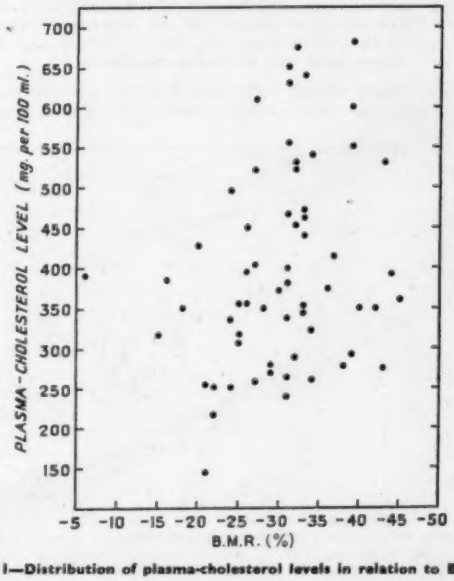

Fig. 1—Distribution of plasma-cholesterol levels in relation to B.M.R.

agreed (Peters and Man 1950) that, although the plasma-cholesterol level is almost always raised in hypothyroidism, it bears no relation to the severity of the disease in different patients. Hurxthal (1934), in a small series with a mean blood-cholesterol level of 355 mg. per 100 ml. and a mean B.M.R. of −26%, claimed a correlation between these levels, but none is apparent from his data. In the present series the plasma-cholesterol levels were within so-called normal limits in 7 cases, and there was no significant correlation between the plasma-cholesterol levels and the B.M.R.: correlation coefficient (r) = 0·22, P = 0·07.

Changes in Body-weight in Hypothyroidism

Since the committee of the Clinical Society of London (1888) reported that, in myxœdema, "an increase in bulk and weight is very constant," overweight has been one of the diagnostic criteria of hypothyroidism. Means (1948) states that some degree of slight obesity (which he does not define) is present in more than 80% of cases, but Spence (1950) considers that obesity [undefined] is not the rule. Apart from the work of Plummer (1940) there has been no quantitative assessment of this obesity. Overweight is easier to measure than obesity (which is difficult to define), and the weights of the patients in this series, both before and after thyroid treatment, have been compared with standard weights.

Statistical Procedure

In this series only female patients are considered, because the number of male hypothyroid patients is small. Accurate weights were not available for 17 patients. The standard normal weights of the population (classified by age and height) have been taken from the British tables of Kemsley (1950, 1952). Each patient's weight was then compared with a standard weight.

(1) To the patient's nude weight and height (measured in the department) were added respectively 6 lb. and 1½ inches, allowances for clothes and shoes. These allowances were recommended by Kemsley (1952) and have been confirmed as correct average adjustments by our observations.

(2) Kemsley's (1952) tables give the mean weights of the population, clothed and shod, in 1943. The weight of the population as a whole has increased since 1943 (Kemsley 1953, Harries and Hollingsworth 1953), and 3 lb. must be added to each tabulated weight to find each mean standard population weight at the time that the hypothyroid patients were attending.

(3) The patient's adjusted weight is compared with the adjusted mean tabulated weight of the population which corresponds to the patient's age and adjusted height, and the difference between these two weights is calculated.

Let d = mean weight difference of all the patients considered, being the mean amount overweight of that group of patients: n = number of patients in group: s = S.D. of the differences. Then significance (t) of this mean weight difference from the normal weight—i.e., 0 lb. overweight = $\frac{d\sqrt{n}}{s}$ — from which can be calculated P, the probability that this overweight could have arisen by chance. A value of P less than 0·05 is considered to denote statistical significance—i.e., that the patients in the group are overweight compared with a normal population.

A control group of 40 patients with non-toxic simple goitre, seen during the same period, was analysed:

d = 0·4 lb., s = ± 17·4 lb., t = 0·1, P = 0·9.

As clinically there is no reason why this group should be underweight or overweight, this procedure appears realistic.

If all the hypothyroid patients are considered together (100 cases):

d = 6·3 lb., s = ± 23·9 lb., t = 2·6, P = 0·005.

The overweight of the 66 idiopathic hypothyroid patients (d = 6·3 lb., s = ± 22·5 lb.) and of the 34 other hypothyroid patients (d = 6·4 lb., s = ± 26·7 lb.) is the same. It is therefore justifiable to consider all the hypothyroid patients together and to conclude that they are, as a group, significantly overweight.

The less rigorous method of comparison used by Plummer (1940) can also be applied. He compared the weights of 200 patients with average normals and found that 62% of the patients were overweight. In the present series 63% of the patients had a weight above the standard mean, whereas 44% of a normal population have a weight above the mean because of the positive skewness of the weight deviation (W. F. F. Kemsley, personal communication).

The amount overweight or underweight of each patient, plotted against her B.M.R., is shown in fig. 2. The amount overweight of a hypothyroid patient cannot be correlated with the B.M.R. (r = 0·16, P > 0·1), showing that a patient's gain in weight bears no apparent relation to her lowered B.M.R.

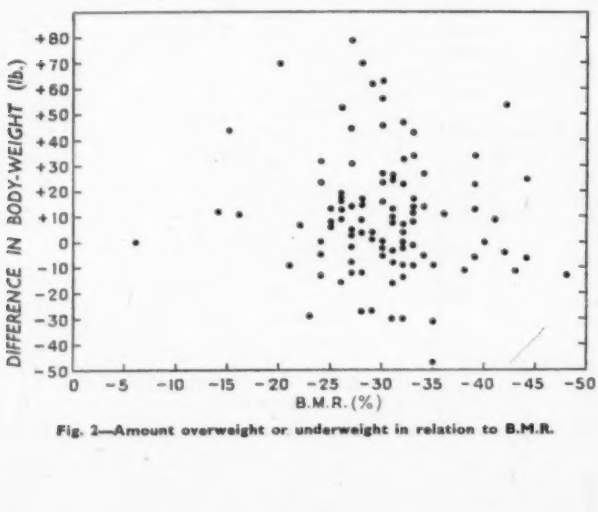

Fig. 2—Amount overweight or underweight in relation to B.M.R.

Change of Weight of Hypothyroid Patients on Treatment

Weight records of 58 of the 100 female hypothyroid patients discussed above were available, after successful treatment of the hypothyroidism, about two months after the initial weight record. Inadequate data were available for weight changes of 42 patients to be included.

The initial overweight of the 58 patients who responded to treatment was:

d = 10·9 lb., s = 20·0 lb., t = 4·1, P = 0·001.

This degree of initial overweight is significantly higher than that of the 42 patients whose weight change is not considered here. No satisfactory explanation can be given for this because the end-result of 33 patients is not known.

Table VI shows the changes in weight resulting from successful treatment with thyroid gland. Although a few patients gained weight, usually a significant amount of weight was lost, the mean loss being:

8·4 lb., s = ± 8·1 lb., t = 7·9, P < 0·001.

After treatment the weight of cured hypothyroid patients was not significantly different from the normal:

d = 2·5 lb., s = ± 18·8 lb., t = 1·0, P = 0·3.

TABLE VII—CHANGE OF WEIGHT OF HYPOTHYROID PATIENTS AFTER TREATMENT WITH THYROID GLAND

—	Gain		Loss		
Change of weight (lb.) . .	19–10	9–0	0–9	10–19	20–29
No. of patients . .	1	9	23	19	6

In Plummer's (1940) series the mean amount overweight before treatment was 10·1 lb., and an average of 13 lb. was lost during treatment.

Although no special study was made here on the nature of the excess weight, the return of the mean weight to normal after treatment supports the view (Means 1948) that it is composed of myxœdema tissue and water and not of body-protein.

Summary and Conclusions

In six and a half years 227 patients were examined who were hypometabolic, having a basal metabolic rate (Aub du Bois) below −25%. No definite diagnosis was possible for 20 patients. Of the 88 who were known not to have primary hypothyroidism, the majority showed other endocrine deficiencies (particularly hypopituitarism), but some had simple obesity or miscellaneous general disorders.

The 119 clinically hypothyroid cases in this hypometabolic series have been supplemented by 21 other cases of hypothyroidism seen during the same period. This series of 140 cases consisted of:

Idiopathic hypothyroidism.—93 patients (86% of them women). The mean age at onset was 45 years. The inpatient incidence was 0·07%.

Postoperative hypothyroidism.—31 patients. The incidence of hypothyroidism following thyroidectomy was 4%, and this incidence appeared to be independent of sex and of the initial state of the thyroid gland.

Other conditions.—Hypothyroidism was also seen following diseases of the thyroid gland (3 patients), treatment with anti-thyroid drugs (4 patients), irradiation of the neck (6 patients), and ^{131}I therapy (3 patients).

The mean B.M.R. of the hypothyroid patients was −30·6%, but 5 patients had a B.M.R. within normal limits.

The plasma-cholesterol level was raised in all but 7 of the cases in which it was estimated. There was, however, no appreciable correlation between the degree of hypercholesterolæmia and the degree of hypometabolism in different patients.

The hypothyroid patients were usually overweight, the average gain in weight (lost on successful treatment) being about 6 lb. There was no appreciable correlation between the degree of overweight and the degree of hypometabolism in different patients.

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PILONIDAL SINUS OF THE UMBILICUS

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THE umbilicus is an uncommon but well-recognised site for pilonidal sinus. The condition differs from the common granulomatous sinus of the same region only by the presence of hairs. Like pilonidal sinus of the interdigital clefts of barbers, it has never been regarded as anything but acquired. Weale (1955) has shown that in pilonidal sinuses of the natal cleft the hairs lay with their roots pointing deeply. His conclusion, however, that this proved a congenital origin has been disputed

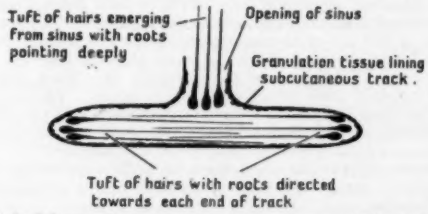
Tuft of hairs emerging from sinus with roots pointing deeply
Opening of sinus
Granulation tissue lining subcutaneous track.
Tuft of hairs with roots directed towards each end of track

Fig. 1—Scheme of arrangement of hairs in granulating track

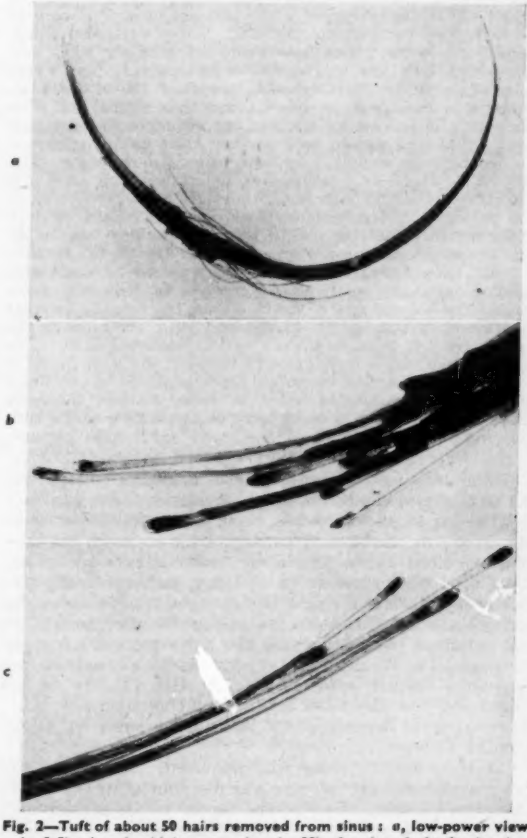

Fig. 2—Tuft of about 50 hairs removed from sinus: *a*, low-power view (× 3·5); *b* and *c*, high-power view (× 28) of each end of tuft, showing peripherally directed orientation of all hair bulbs.

(Patey and Scarff 1955). So far as we know, no-one has yet studied the orientation of hairs in an undisputed acquired pilonidal sinus. Since we have recently had such an opportunity in the case of a pilonidal sinus of the umbilicus, our findings may be of interest in the more general problem of the mechanism of entry of hairs in other types of the same condition.

Case-report

An Indian student, aged 26, presented in November, 1955, with a four weeks' history of a purulent discharge from the umbilicus. There was nothing of note in his previous history.

On examination he was healthy, apart from the umbilical condition. The orifice of a discharging sinus, with exuberant granulations from which a tuft of hairs was protruding, was seen in the folds of his umbilicus. On his abdomen and generally he had an unusually dense growth of dark tough hair. The protruding tuft of hairs was extracted and laid on a sheet of paper, and its original orientation in the sinus was carefully noted. It was hoped that the sinus would heal with their removal, but this did not happen, and the patient was admitted for operation a month later.

At operation the sinus was found to be a track lined with granulation tissue and running cranially and caudally for about 2 cm. in the subcutaneous tissues of the abdominal wall, its orifice being situated about half-way along it (fig. 1). Many more tufts of hairs were found inside the track and were removed, and their exact orientation noted. The umbilicus and the sinus were then completely excised, and the edges of the wound approximated by subcutaneous and skin sutures. The wound healed uneventfully by first intention.

Microscopy showed the typical findings: a sinus lined with granulation tissue and containing hairs but no epithelium, no hair follicles, and no sebaceous glands.

The hairs removed from the sinus numbered about 300. 248 were individually counted, and about 50 others were in a tuft which was preserved whole and not broken down into its individual components (fig. 2*a*). There were also a few hairs lying in the granulation-tissue lining of the sinus and discovered only on histological examination. The exact orientation in the sinus was determined of 210 of the hairs removed and of the 50 or so hairs from the tuft (fig. 2*a*). The remaining 38 hairs escaped from our attempts to determine their precise orientation because they came away haphazard on swabbing the wound or for some other similar reason. The 260 hairs whose orientation was determined fell into two groups: (1) the tuft protruding from the sinus and removed at the patient's first attendance consisted of 27 hairs, and in every instance the root end of the hair was directed deeply and the peripheral end projected free (fig. 1); (2) the remaining 233 hairs were collected into five separate tufts not protruding externally but lying in a curve in the long axis of the sinus. The hairs in four of the tufts were individually counted and found to number 21, 27, 34, and 101; the hairs in the remaining tuft were, as already noted, estimated at 50. The arrangement of the hairs in every tuft was the same (figs. 2*a*, *b*, and *c*): each end of the tuft consisted entirely of hair bulbs projecting to various extents, the distal ends of the hairs intertwining to form a whorl towards the middle of the tuft.

Discussion

Pilonidal sinus of the umbilicus is generally regarded as an acquired condition, and no evidence to the contrary has, so far as we are aware, been produced. It seems to be merely an uncommon variety of the common granulomatous sinus of the umbilicus resulting from accumulation of dirt, fragments of clothing, and epithelial and secretory débris in the umbilical depression. If an acquired origin is accepted in this case, one must conclude that, in an acquired pilonidal sinus, the hairs are not arranged haphazard as Weale (1955) suggested. This case therefore provides further evidence against the validity of his argument that the pilonidal sinus of the natal cleft must be congenital because of the standard orientation of the contained hairs.

If the present sinus was acquired, the very hairy abdominal wall provides an obvious source for the hairs; but the question arises of the forces which caused their entrance into the sinus. Three mechanisms have been suggested: suction (Patey and Scarff 1948, Brearley 1955); growth forces from external hairs curling back on themselves (Brearley 1955); and friction (Patey and Scarff 1955). Of these three, suction could hardly have been the mechanism in the present case in view of the orderly arrangement of the hairs. Growth forces also would have caused the hairs to enter with their distal ends first—the opposite of what was found. We have previously noted that frictional forces applied along the long axis of a hair will propel it in the direction of its root in view of the arrangement of the scales (Patey and Scarff 1955). The only reasonable mechanism in the present case therefore seems to be friction between the clothing and the abdominal wall driving loose hairs, root first, into the orifice of the sinus. From there they went into either the upper or the lower lumen of the sinus, the distal ends of the opposingly directed groups of hairs intermingling towards the middle.

The other possible explanation is that the condition was congenital, and that the hairs grew from a hair-producing lining; but this would involve all the assumptions that have made a congenital origin of postnatal pilonidal sinuses so difficult to accept—i.e., that there was an original congenital rest with a hair-producing lining of skin, and that as a result of a short period of infection the skin and its appendages have been destroyed completely and without trace. A congenital origin seems even more difficult to accept for an umbilical than for a natal-cleft pilonidal sinus. We therefore suggest that the present observations not only indicate the probable mechanism of entry of hairs into an acquired pilonidal sinus, but also indirectly strengthen the case for the acquired origin of natal-cleft pilonidal sinuses.

Summary

A case of pilonidal sinus of the umbilicus is reported.

The sinus contained 300 hairs, and the orientation of 260 of them was determined.

In all the hairs in which the orientation was determined the root ends lay deeply.

Friction was the most probable mechanism of entry of the hairs into the sinus.

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PHÆOCHROMOCYTOMA

CATECHOLS IN URINE AND TUMOUR TISSUE

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I HAVE lately had an opportunity to examine the urine and tumour tissue from a case of phæochromocytoma. Shortly afterwards a second specimen of phæochromocytoma tissue, which had been discovered at necropsy, came into my possession. The biochemical investigation of these materials revealed several hitherto unrecorded facts.

Methods

Estimation of Catecholamines in Urine

The procedure used has recently been described (Weil-Malherbe 1956, Weil-Malherbe and Bone 1956).

Briefly it consists in the following steps: (1) hydrolysis of the acidified urine by boiling for 20 min.; (2) isolation of the catechol fraction by adsorption on a column of aluminium oxide and elution with dilute acid; (3) isolation of the catecholamine fraction by adsorption on a column of 'ZeoKarb 225' and elution with barium-chloride solution; and (4) fluorimetric estimation by a combination of the methods of

Weil-Malherbe and Bone (1952) and of von Euler and Floding (1955). The former estimates the sum of the three catecholamines—adrenaline, noradrenaline, and 3-hydroxytyramine—while the latter separately estimates adrenaline and noradrenaline. Hydroxytyramine is obtained by difference.

Estimation of Catechols in Phæochromocytoma Tissue

The tumour specimens were received as solid pieces of tissue immersed in 0·1 N-hydrochloric acid (for weights and volumes see table II). The time-intervals between surgical removal or death and immersion in acid were about 3 hours and 16 hours. Both samples remained in acid for about 24 hours before being analysed.

A tissue extract was prepared by grinding a sample of about 1 g. with acid methanol, mixing the methanol extract with 5 vol. of *n*-butanol, and re-extracting with dilute hydrochloric acid (cf. Weil-Malherbe and Bone 1954, Montagu 1956). Samples of the extract and of the acid in which the tissue had been immersed were purified separately by steps 2 and 3 of the procedure used for the analysis of urine. A further step was necessary to separate the catecholamine fraction from 3 : 4-dihydroxyphenylalanine (DOPA) which was present in the tumour tissue though not in urine. This separation was effected by paper electrophoresis in 0·04 M-sodium acetate buffer pH 5·6 and in a potential gradient of about 10 V per cm. After 3 hours the catecholamine fraction had migrated 12–14 cm., and DOPA about 4 cm., towards the cathode; their positions were located by making a contact print in ultraviolet light (Markham and Smith 1951). Sections were cut out and eluted with 10 ml. of 0·01 N-hydrochloric acid. The amine fraction was analysed fluorimetrically as outlined above.

DOPA forms a fluorescent oxidation product in the reactions of Lund (1950) and of von Euler and Floding (1955) (Weil-Malherbe and Bone 1956); DOPA was therefore estimated fluorimetrically after oxidation with ferricyanide at pH 6 according to von Euler and Floding (1955). In the ethylenediamine reaction (Weil-Malherbe and Bone 1952) DOPA forms a fluorescent condensation product which is only slightly soluble in isobutanol, about 90% of the fluorescence remaining in the aqueous phase. This was used as a confirmatory test.

TABLE I—CATECHOLAMINES IN URINE

—	Adrenaline (μg. per 24 hr.)	Noradrenaline (μg. per 24 hr.)	Hydroxytyramine (μg. per 24 hr)
Patient with phæochromocytoma	36·9	257	3420
The same, after 2 days on protein-free diet	48·2	322	1430
The same, after operation	17·5	38·7	51·3
Patients with essential hypertension (means of 11 cases, ± S.E.)	24·3 ± 3·60	46·4 ± 6·83	249·9 ± 52·9

Results and Discussion

Table I shows the 24-hour excretion of the three catecholamines by the phæochromocytoma patient, as determined on two occasions, and, for comparison, the mean values found in 11 patients with severe hypertension of different ætiology. It is, of course, well known that the excretion of noradrenaline is greatly increased in phæochromocytoma patients, and this was also found in the present case. There was, in addition, an increase of hydroxytyramine excretion which was, proportionately, as large as, or larger than, the increase of noradrenaline excretion. von Euler (1951) found qualitative evidence for an increased excretion of hydroxytyramine in 1 case of phæochromocytoma.

The urine was examined again after the patient had been on a protein-free diet for two days. This régime did not much affect the excretion of adrenaline or of noradrenaline, but it decreased the excretion of hydroxytyramine. There is evidence that hydroxytyramine is the precursor of noradrenaline and adrenaline (Hagen 1956, Leeper and Udenfriend 1956, Neri et al. 1956). Its rate of excretion may therefore depend on the amount available after the requirements of noradrenaline synthesis have been met; probably a restriction of protein intake would reduce this surplus fraction of hydroxytyramine. After the operation the excretion of all three catecholamines returned to normal.

TABLE II—CATECHOL COMPOUNDS IN PHÆOCHROMOCYTOMA TISSUE

Specimen no.	Weight of sample (g.)	Volume of immersion fluid (ml.)	Fraction analysed	Adrenaline (μg. per g.)	Noradrenaline (μg. per g.)	Hydroxytyramine (μg. per g.)	DOPA (μg. per g.)
1	4·88	68	Fluid	115	722	457	138
			Tissue	8·6	48·4	37·2	9
			Total	123·6	770·4	494·2	147
2	9·34	26	Fluid	79·5	625	41·5	7·8
			Tissue	27·1	139	8·3	< 2
			Total	106·6	764	49·8	> 7·8 < 9·8

The estimation of adrenaline and noradrenaline in plasma by the method of Weil-Malherbe and Bone (1953), which, in another patient with phæochromocytoma, had shown significantly increased levels (Richardson et al. 1955), did not reveal any increase in the present case. The concentrations found were adrenaline 0·64 μg., and noradrenaline 3·36 μg. per litre of blood. These normal levels are not surprising since the symptoms here were paroxysmal. For diagnostic purposes, therefore, urine analysis is to be preferred.

The concentrations of catechol compounds found in the two tumours are shown in table II. The first tumour contained considerable amounts of hydroxytyramine and DOPA, substances not previously demonstrated in phæochromocytoma. The same substances were also found in the second tumour; though the figures are smaller, they are significantly outside the experimental error. The concentrations of adrenaline and noradrenaline, on the other hand, are strikingly similar in the two tumours and are also in good agreement with the results of von Euler et al. (1953).

Whether the lower concentrations of hydroxytyramine and DOPA in the second tumour reflect a real difference from the first tumour or whether they are due to a greater susceptibility of these substances to post-mortem decomposition, compared with adrenaline and noradrenaline, cannot be decided at present. It may be mentioned that Shepherd and West (1953) were unable to find paper-chromatographic evidence for the presence of hydroxytyramine or of DOPA in extracts from two phæochromocytomas, while Manger et al. (1954) detected hydroxytyramine in 1 out of 35 phæochromocytomas analysed chromatographically. The extracts from the two tumours analysed in this laboratory were also examined by paper chromatography, with a butanol-acetic acid solvent (Partridge 1948). A hydroxytyramine spot was clearly visible in the chromatogram of the first tumour, but it was absent in that of the second.

When the amounts of catechol compounds found in the immersion fluid and in the tissue are compared, it appears that, in both the cases studied, the amounts remaining in the tissues are no greater than would be expected on the assumption of uniform distribution and of a dry weight of about 25%. The immersion in 0·1 N-hydrochloric acid therefore led to complete diffusion, though the tissue was not comminuted in any way.

Summary

The urinary excretion of 3-hydroxytyramine in a case of phæochromocytoma was increased as much as, or more than, the excretion of noradrenaline. After surgical removal the tumour was found to contain, in addition to adrenaline and noradrenaline, considerable quantities of 3-hydroxytyramine and 3 : 4-dihydroxyphenylalanine (DOPA). A second tumour, discovered at necropsy 16 hours after death, contained similar amounts of adrena-

line and noradrenaline but very little hydroxytyramine and DOPA.

I am greatly indebted to Dr. J. Fawcett, the physician in charge of the case, Mr. J. E. Richardson, F.R.C.S., who performed the operation, Dr. P. Whitehead, who supplied the second tumour specimen, and Mr. A. D. Bone, F.I.M.L.T., who gave expert technical assistance.

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IDENTIFICATION OF HYDROXYTYRAMINE IN A CHROMAFFIN TUMOUR

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THE possible synthesis of adrenaline and noradrenaline in the body, with hydroxytyramine as an intermediate, was suggested by Blaschko (1942). Hydroxytyramine occurs in the urine of animals, and in man its excretion amounts to 0·1–0·2 mg. daily, being some five times greater than that of noradrenaline (von Euler et al. 1951). In mammalian tissues it has been found only in cardiac muscle of sheep and in the adrenal medulla of sheep and ox. It has not been detected in tissues containing a high proportion of noradrenaline, such as the adrenals of young or embryonic mammals, or in para-aortic tissues of animals and the organs of Zuckerkandl of man. Nor has it been found after exhausting the adrenal by excessive secretion or by interfering with normal sequences of synthesis using anti-metabolites (West 1953). Indeed its absence has been so conspicuous as to throw doubt on its function as a precursor.

It is of interest, therefore, to record the finding of hydroxytyramine in large amount (1·97 mg. per g.) with some noradrenaline (0·15 mg. per g.) in a biopsy specimen taken from a paraganglionic tumour in a girl, aged 18, with fluctuating hypertension. The tumour was locally invasive and was considered to be malignant. The catecholamines were extracted without delay and separated by paper chromatography. Hydroxytyramine and noradrenaline were identified by their R_F values in phenol/water saturated with sulphur dioxide, and in *n*-butanol/acetic-acid/water using spraying reagents which included potassium ferricyanide-formaldehyde, potassium iodate, diazotised *p*-nitroaniline, iodine and Ehrlich's reagent, and ninhydrin.

No trace was found of other compounds, including adrenaline, 3 : 4-dihydroxyphenylalanine (DOPA), 3 : 4-dihydroxyphenylserine, *p*-hydroxyphenylethanolamine, epinine, 5-hydroxytryptamine, 5-hydroxyindoleacetic acid, and protocatechuic acid, some of which have been suggested as intermediates in adrenaline synthesis.

This is believed to be the first occasion on which hydroxytyramine has been reported as the predominant catecholamine in a phæochromocytoma. There have been several reports of its absence from tumours, but Manger et al. (1954) reported its presence with adrenaline and noradrenaline in only 1 of 35 tumours examined chromatographically, and related it to post-mortem change in an embalmed specimen; and von Euler (1951) found as much as 2000 μg. daily with similar amounts of noradrenaline in the urine of a patient with a phæochromocytoma containing 0·05 mg. of adrenaline and 8·4 mg. of noradrenaline per g. of tumour. In the present case there was no correlation between the composition of the tumour and the urinary excretion, which was 124–1045 μg. of noradrenaline and 50–450 μg. of hydroxytyramine daily. A small amount of hydroxytyramine with less noradrenaline was detected by R_F value and fluorescence in the spleen of the same patient.

The occurrence of hydroxytyramine in an apparently malignant tumour is of interest theoretically in consideration of the limitations in synthesis by dedifferentiated tissue thus revealed; many phæochromocytomata with metastases have been described as being biologically inert (Andreassen 1954), suggesting even further curtailment. From a practical viewpoint, assessment of malignancy on histological grounds is difficult in the case of phæochromocytoma and may be impossible in the absence of metastases (Symington and Goodall 1953). Of the relatively few tumours which have been biologically active and which have been examined for their catecholamine content still fewer have been classified as malignant, and these have been said to contain adrenaline and noradrenaline only (Manger et al. 1954, one case with metastases, Iseri et al. 1951, one case without metastases). The relationship between hydroxytyramine and malignancy merits further study.

I am indebted to Mr. D. Aiken, F.R.C.S., for the opportunity of studying this case; to Dr. A. Jordan for advice and encouragement; to Dr. H. Blaschko for 3 : 4 dihydroxyphenylserine, and to Dr. G. B. West for *p*-hydroxyphenylethanolamine and epinine.

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PURPURA GANGRENOSA

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ACUTE non-thrombocytopenic purpura is fairly common in the course of meningococcal septicæmia and sometimes complicates β-hæmolytic streptococcal infections, notably scarlet fever (McConnell and Weaver 1922, Box 1933, Fox and Enzer 1938, Chambers et al. 1952). More than 100 such cases have been published.

The main features appear to be the acute onset of widespread and often confluent cutaneous purpura, hæmorrhages into mucosa and viscera, and a tendency to gangrene. Visceral involvement sometimes leads to bleeding into the gut and urinary tract.

Various names have been used to describe the condition. Purpura gangrenosa, purpura fulminans (Guelliot 1884), and purpura necrotica are those in common use. The most severe type is accepted as being the fulminating variety, of which Osler wrote:

" In this very rare variety, ecchymoses extend with startling rapidity and within a few hours an entire extremity or greater part of the trunk may assume a blue or reddish black colour.

Fig. 1—Case 1 : appearance of rash two days after admission to hospital.

This disease usually ends fatally in from 18 to 48 hours and no patient has recovered."

However, Chambers et al. (1952) collected 7 published cases in which recovery took place. This divergence probably arises from differences in nomenclature.

Case 1 described here is remarkable in that, despite its severity, the patient recovered and is now well. Neither of our patients exhibited any evidence of visceral involvement apart from an unconfirmed report of the passage of reddish urine by case 2 on the morning of of the day of admission.

Case-reports

Case 1.—A clerk in the W.R.A.C., aged 26, was admitted to the Military Hospital, Wheatley, on April 20, 1953. Two days previously, on return to her unit from holiday, during which she had been sunbathing a great deal, she developed an irritating, sparse, and slightly papular rash on the backs of her hands and forearms, some pain and stiffness in her right wrist, and a sore throat. She was given three doses of diphenhydramine hydrochloride ('Benadryl') 50 mg. six-hourly by the medical officer of her unit, and next day, the rash and the other symptoms having abated, the benadryl was discontinued; but a day later she developed a fulminating and intense purpuric rash. She was admitted to hospital within four hours of its onset.

On admission she was shocked and felt great pain in the affected areas. Her pulse-rate was 90 and temperature 99°F. No previous history of purpura, hæmorrhage, or bruising was forthcoming. Her menstrual periods had been normal, and she had had no allergic illness. There was no family history of similar upsets. Apart from the diphenhydramine she had taken no drugs nor recently shared any foods which had produced symptoms of any kind in other people.

On examination the rash and some faucial inflammation were the only abnormal signs. There was no lymphadenopathy, and the liver and spleen were impalpable.

The rash involved all four limbs in a strikingly symmetrical way (fig. 1). It had started in those areas of the hands already affected by the initial papular eruption and had spread rapidly, especially on the extensor aspects of the limbs. The tips of the nose and chin, the malar areas, the lobes of the ears, and a small area on the hard palate were also involved. The mode of development could be followed as the rash extended. Numerous areas of pink erythema, about 1 mm. in diameter, first appeared. These rapidly became papular and then developed central petechial hæmorrhages, which finally coalesced to produce a deep purplish-black confluent area, whose extending edges were raised and pink. The unaffected areas of the trunk were conspicuously pale and remained so throughout the illness. The purpura prevented the taking of blood-pressure readings, and a Hess test could not be made.

Investigations.—Examination of the blood showed hæmoglobin 13·5 g. per 100 ml., leucocytes 11,000 per c.mm. (polymorphs 72%, lymphocytes 16%, monocytes 4%, eosinophils 8%), platelets 150,000 per c.mm. (mean of three counts), bleeding-time (Duke) 1 minute, clotting-time (Dale and Laidlaw) 1 minute, cold agglutinins 1 : 8, and direct and indirect Coombs tests negative. A catheter specimen of urine contained no red cells or protein; but there was a slight growth of *Escherichia coli* and *Staphylococcus albus* on culture. The stools contained no occult blood. The blood was sterile on culture on three occasions. A throat-swab culture produced a moderate growth of β-hæmolytic *Streptococcus pyogenes* and pneumococci.

Treatment.—The patient was treated by supportive measures, and fluids alone were given by mouth. Cold packs were applied to the affected parts to relieve pain, which was a prominent feature throughout the illness and for which she required morphine in the first twenty-four hours of the disease. Since injections were impracticable, she was given aureomycin by mouth to control the throat infection.

Progress.—Forty-eight hours after admission the skin over the purpuric areas began to vesiculate, as with a second-degree burn. At this time the deep colour of the skin began to fade throughout the affected areas. The vesiculation progressed, and by the tenth day of the illness some of the affected areas were resuming a nearly normal appearance. On the eleventh day severe pain developed in the toes of both feet, which became gangrenous. Within twenty-four hours the left index finger was similarly affected. At this time the peripheral pulses were easily palpable, but the skin everywhere felt cold, and in the areas unaffected by purpura there was noticeable pallor, although the hæmoglobin level at this time was 11·9 g. per 100 ml. It became clear that gangrenous changes had taken place in the toes of the right foot, the index finger of the left hand, the tip of the nose, an area 12 × 9 cm. on the outer aspect of the left thigh, and the skin of the flexor surfaces of both arms. The patient was transferred to the care of Mr. Eric Peet, who amputated the toes of the right foot and skin-grafted the arms. After this her recovery was uneventful, and she is now leading a normal active life, with no residual disability.

Case 2.—A married woman, aged 69, was admitted to the Radcliffe Infirmary on Jan. 26, 1955, under Dr. P. C. Mallam. She had had rheumatoid arthritis for fourteen years and had been bedridden for five years. She was taking small quantities of aspirin to control her pain, but no other drugs. Four days before admission a purpuric rash developed, beginning on the extensor surface of the left thigh and involving the other thigh and the extensor surfaces of both shoulders within twenty-four hours. The lesions were purple and discrete, the largest ones being about 5 cm. in diameter. During the development of this rash the joint pains became worse and the patient had several hot sweats. On the morning of the day of admission her urine was reddish. She had no vomiting, abdominal pain, disturbance of the bowels, melæna, or frank blood in her stools. She had a cough producing white frothy sputum. She had no hæmoptysis, and had no personal or family history of similar episodes.

On admission she was flushed, sweating, and in pain. Her temperature was 99°F, pulse-rate 90, and blood-pressure 125/75 mm. Hg. She showed the changes of typical rheumatoid arthritis and had several badly infected teeth. Her spleen and liver were impalpable, there was no

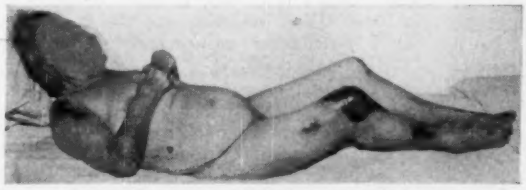

Fig. 2—Case 2 : seven days after onset of rash.

lymphadenopathy, and the mucosæ appeared normal. The only other positive finding was of extensive ecchymoses on both shoulders and both thighs and ankles (fig. 2). These lesions were very tender and indurated. The surrounding skin was erythematous, and the skin over the lesions was beginning to vesiculate but was still unbroken. The patient said that the bruises felt like burns, and their appearance suggested second-degree burns.

Investigations.—Hæmoglobin 12·3 g. per 100 ml., leucocytes 7500 per c.mm. (normal film), eosinophils 98 per c.mm., no L.E. cells, platelets 113,000 per c.mm., bleeding-time (Ivy) 8 min. 5 sec., 5 min. 30 sec., 6 min. 45 sec., and 12 min., prothrombin ratio 1·0, and tourniquet test negative. Her urine contained nothing abnormal.

Treatment and Progress.—Three days after admission the patient was started on cortisone 50 mg. t.d.s. by mouth, and this appeared to benefit her rheumatoid arthritis considerably but did not affect the purpura. From a throat swab three weeks after the onset only *Strep. viridans* and *Strep. pneumoniæ* were grown. A month from the onset, three days after the dose of cortisone was reduced to 25 mg. b.d., a new crop of purpura appeared on the lower limbs, involving the calves and the third and fourth toes of the left foot, which appeared gangrenous. The hæmoglobin was 14·7 g. per 100 ml., leucocytes numbered 6100 per c.mm. (normal film), platelets 223,000, 199,000, and 181,000 per c.mm. on three counts, bleeding-time 3 min. 15 sec., and tourniquet test negative. The cold-agglutinin titre was 1 : 32, and blood-cultures were sterile. Swabs from the throat grew the same organisms as before. The dosage of cortisone was increased to 50 mg. t.d.s.

Development of Lesions.—This second group of lesions allowed their development to be studied. The initial change was discrete hæmorrhage into the skin. This was followed in two or three days by vesiculation of the overlying skin, each bulla being filled with serous exudate. At three or four days an erythematous areola appeared round each patch. The bulla then ruptured, leaving a dark shiny blood-clot underneath. The larger areas of purpura formed sloughs, separating first at the edge and leaving behind healthy granulation tissue, and the normal peripheral circulation was restored. The patient is still receiving cortisone, and no further lesions have developed.

Biopsy of one of the lesions eight days after the onset of the second attack of purpura showed loss of epidermis over the affected area, with a few surviving basal cells; re-epithelisation at the edge of the ulcer; and, beyond this, œdema of the prickle-cell layer, with slight hyperkeratosis. The dermal collagen was coarse and showed some hyalinisation. Several blood-vessels in it and in the subcutaneous fat showed intravascular hæmolysis, which might have been an artefact. There was some perivascular lymphocytic infiltration.

COMMENT

The surprising aspect about case 1 was the time of onset of gangrene of the extremities, when the peripheral pulses were easily palpable and the overlying purpura and brawny swelling in the foot, for instance, had much regressed. Whether this was due to thrombotic occlusion of more distal smaller vessels, to inflammatory occlusion of these vessels, or to severe spasm due to the local resorption of vasoconstricting substances produced by the breakdown of blood remains speculative. The commonly cited explanation—that pressure caused by the extravasated blood occludes the vessels—does not seem likely. Box (1933) drew attention to the striking pallor of the skin in normal areas, out of proportion to the degree of anæmia, and thought this too could be explained in terms of occlusion caused by interstitial pressure. In case 1 this pallor was present in areas in which no extravasation had taken place—a fact which supports the idea of a circulating vasoconstrictor substance responsible for the gangrene.

Discussion

The pathogenesis of the changes which take place in this type of purpura is quite unknown. Koller et al. (1950) have described 2 cases in which there was a deficiency of factor V. This has not been sought in other cases; and, though there was no defect in blood-coagulation in the 2 cases here described, a one-stage prothrombin-time was estimated only in case 2, in whom it was normal. The histological findings in case 2 were similar to those described previously and do not offer any new evidence.

The similarity between the mode of development of the lesions in purpura gangrenosa and the purpura in the Sanarelli-Shwartzman reaction in animals is striking. Black-Schaffer et al. (1947) described the production of widespread purpuric lesions in rabbits by using preparations of *Neisseria meningitidis* in the same way as other "antigens" were used by Sanarelli (1924) and Shwartzman (1928) to produce the phenomenon named after them. In man a similar fatal purpuric reaction has been described following closely spaced intramuscular and intravenous injections of typhoid vaccine, and such a reaction has been invoked to explain fatal hæmorrhagic infantile diarrhœa due to a coliform organism (McKay and Wahle 1954).

It is reasonable to postulate that, during the course of an infection, the necessary conditions for the development of such a reaction might be produced by the release of "antigen" into the blood-stream and its subsequent fixation in the tissues, a later similar release of "antigen" acting as the challenging dose. Whether, in fact, such a mechanism did operate in the present 2 cases is quite speculative. At least in case 1 an organism (β-hæmolytic streptococcus) known to produce the Waterhouse-Friderichsen syndrome (Black-Schaffer et al. 1947) was present. In case 2 such an organism might well have gone undetected because no throat swab was taken early in the disease.

Neither of our patients showed evidence of the visceral lesions observed in the Sanarelli-Shwartzman reaction. Such lesions cannot be definitely excluded, since the outcome was not fatal.

It may be pertinent that case 1 had been sunbathing for several days in a one-piece bathing-suit just before the onset, and the lesions were confined to the exposed areas. Perhaps increased capillary permeability associated with such exposure allowed the fixing of "antigen" at these sites and led to localisation of the purpura. In case 2 no such mechanism can be invoked.

No guide to specific treatment of purpura gangrenosa has been obtained in the present 2 cases. In case 2 cortisone does not appear to have suppressed the underlying process, and in case 1, from whom cortisone was withheld, the only drug used was aureomycin. Good and Thomas (1952) and Cluff and Berthrong (1953) have shown that heparin suppresses the Sanarelli-Shwartzman reaction in animals; so heparin may deserve a trial in non-thrombocytopenic purpura associated with acute infection.

Summary

2 cases of acute non-thrombocytopenic purpura are described. In each, the remarkable feature was the development of gangrene. The recovery of both patients cannot be ascribed to specific therapy.

Thanks are due to Dr. Patrick Mallam for permission to publish details of the second case.

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AFTER FIFTY YEARS

A DIAGNOSIS OF THORACIC ANEURYSM CORRECTED

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THIS is the clinical history, from the age of 17 to his death at 76, of an ardent Salvation Army bandsman who was a life-long abstainer from alcohol and tobacco. It starts with a portion of an article from *The Lancet* of Aug. 22, 1903, and ends with the post-mortem findings.

THE SUCCESSFUL TREATMENT OF THORACIC ANEURYSMS BY LARGE DOSES OF IODIDE OF POTASSIUM

By WILFRED R. KINGDON, M.B., B.S. Durh., late medical officer of the Ticehurst Asylum, Sussex, and formerly assistant medical officer at the Birmingham City Asylum, &c.

"In the treatment of internal aneurysms with iodide of potassium I think that failure often results from the physician hesitating to give a sufficiently large dose, especially should symptoms of iodism manifest themselves. Within the last few years I have had several cases and as all have had a happy termination after the employment of unusually large doses of iodide of potassium I propose to give a short record of two or three of them."

"The third and last case which I propose to describe was the worst and looked for some time almost hopeless. The patient was a man, aged 23 years, who had undoubtedly been suffering for a considerable time and had received various kinds of treatment in accordance with the different diagnoses which had been made. He had been accustomed to play the cornet almost every evening and to this, as the immediate cause, I attributed the trouble. It was six years before I saw him that he first began to be troubled with pain on the left side of his chest which he stated was at times so severe as to produce actual vomiting; at other times it was of a dull aching nature, and increased on taking deep inspiration. After enduring these pains for four months he consulted a medical man who treated the condition as one of rheumatism. After continuing in this state for about a year, the pains troubling him on and off, he noticed a swelling on the left side of his chest near the clavicle. Becoming gradually worse, he consulted several other medical men, two of whom applied iodine externally, while the last said that nothing could be done for him.

"He first consulted me on March 6th, 1901, when I prescribed lead-and-opium lotion to be applied over the swelling which was situated in the second left intercostal space. On March 19th, I placed him on iodide of potassium with some other ingredients of a simple nature. He seemed to have slightly improved, for I lost sight of him and he went on playing the cornet up to December, 1901.

"In January 1902, he had, however, become so ill that when he sent for me on the 11th, I found him in bed and in a most serious condition, the tumour protruding about an inch and a quarter from the anterior wall of the chest and pulsating strongly. It was expansile and a bruit was audible. I at once prescribed a restricted diet, aperients, and iodide of potassium with anodynes and depressants. Some weeks later Sir William Broadbent saw him in consultation with me and thought it best to continue with the same treatment. After he had been in bed for eight weeks, Sir William J. Collins saw him with me and was of the opinion that he had better try another eight weeks of the same treatment."

"About the ninth week I increased the dose to 70 grains three times a day, and one evening the patient became so ill that I was sent for hurriedly, and Dr. F. Edridge-Green who accompanied me on this visit, remarked that he would not give much for the patient's life. The thin part of the anterior wall where the skin was tightly stretched had given way slightly and a considerable quantity of blood had escaped, which, however, ceased as the pressure became lower. Up to then, be it noticed, there was little or no indication of any improvement, and I thereupon increased the iodide of potassium to 80 grains three times daily, the low diet, absolute rest, and scarcely any drink at all being maintained.

"After taking 240 grains daily for a few weeks the patient made very excellent progress; in about seven weeks from the date of the hæmorrhage he was out of bed and in about three weeks more he was at the seaside. I have seen him within the last few weeks and he is looking exceedingly well; he goes to business and leads a quiet life without much inconvenience. Beyond a few spots on his legs and two on his forehead he betrayed no signs of iodism and I cannot help remembering the words of one of my old teachers, who is unfortunately no longer among us, that if iodism showed itself the proper course was to double the dose."

The Patient's Progress

After recovering from the illness thus recorded, the patient was articled to a solicitor but continued his interest in music. He mastered all types of brass instruments and ultimately conducted his band.

In the first world war he volunteered, was passed as fit, and joined the Royal Garrison Artillery. He served 60-pounder guns without stress until severely wounded in both arms and legs at Hill 60 in the autumn of 1917. He was ill for many months, and he remembered being told that he was an early case treated by Carrel's irrigation method.

After his discharge from the Forces he became a Civil Servant and eventually a collector of taxes. He married and had two children. Deformity of the fingers and limited flexion of the elbows obliged him to give up his music, but he could play golf and work in the garden.

In 1950 he began to complain of muscular weakness in the arms, legs, and back which was diagnosed as rheumatism and treated unavailingly by physiotherapy. He was first seen by one of us in February, 1952, when he was found to have wasting of muscles in both arms and hands (partly due to the old wounds), in the pectorals and in both lower limbs.

Investigations at Middlesex Hospital

After admission to Middlesex Hospital for investigation the following report was received:

Clinical examination.—"He appeared to have lost weight, and had moderately severe symmetrical amyopathy affecting all limbs proximally and distally. There were no signs of any chest disease apart from some old calcified foci in the right upper zone which presumably date from the time that he was seen by the late Sir William Broadbent. The blood Wassermann reaction was negative. Apart from wasting, the only positive sign in the central nervous system was that the right plantar response was early extensor. The cerebrospinal fluid was normal. X-rays of the cervical spine showed some degenerative disc disease with osteophytic encroachment on the foramina C.6 and C.7. In view of the absence of pain and any other sign, this cannot account for the wasting."

Biopsy.—"Sections from the left trapezius showed pathological muscle with splitting of the muscle fibres with some subsarcolemmal nuclear proliferation. The appearances are more in favour of a myopathy than a lesion of denervation, but serial sections fail to show a nerve which might clinch the diagnosis.

"Accordingly, the diagnosis is probably that of a myopathy of unknown origin which is progressive and unlikely to respond to any known treatment."

General treatment with vitamins E and B, and physiotherapy kept him in fairly good health but failed to stop the progressive weakness. In September, 1954, he complained of sudden violent substernal pain which was suggestive of coronary thrombosis, but for which, on examination, we could find no cause. Producing the article from *The Lancet* he said that the pain was identical with that caused by his "aneurysm." He was anxious to go away and was not seen again until the end of October, when the pain was definitely in the upper chest. A fluctuating and pulsating tumour, the size of half a hen's egg, was protruding from the upper left quadrant of the manubrium sterni, and a loud systolic bruit was heard over it. His general condition was good. Apart from a slightly enlarged heart, a blood-pressure of 140/100 mm. Hg, and the muscular wasting, there were no abnormal physical signs.

Investigations at Hendon District Hospital

He was admitted to the Hendon District Hospital for examination.

The blood-count was within normal limits; the sedimentation-rate 9 mm. in one hour (Wintrobe); acid phosphatase 0·9 King-Armstrong units; alkaline phosphatase 9 units.

X-ray report.—"The sternum, including the manubrium is not at all clearly seen because of decalcification; the manubrium seems to be expanded and thinned, which is what would happen if there was an underlying aneurysm, but all that can be seen is some calcification in the substernal region, and some calcification in the aortic arch. This is certainly atheromatous and enlarged. There is some general cardiac enlargement."

Report on screening.—"Movements of the diaphragm normal. Left ventricle somewhat prominent and the hilar regions congested. No particular cardiac abnormality seen apart from its size. A tangential view of the swelling showed some transmitted pulsation. The manubrium appears cystic, owing to pressure from an aneurysm or something pressing on its deeper aspect. Only the expanded outer cortex remains."

Aspiration and injection of cyst (Dec. 3).—The pulsation ceased immediately after aspiration; and the left upper and outer quadrant was felt to be skin only stretched over the shell-like edge of a bony cyst. It was injected with radio-opaque fluid and reported on by the radiologist: "The medium lies in a large irregular superficial space immediately below the anterior surface of the expanded manubrium sterni. There is a large space in the thorax below the anterior chest wall connected by an isthmus. There seems to be no connection with the aorta. 24 hours later the space was empty of contrast medium."

Report on aspirated contents.—"Sections of the deposit from the aspirated fluid show a fibrinous clot only. There is nothing to indicate or disprove that the fluid came from an old aneurysm. Aerobic and anaerobic cultures sterile."

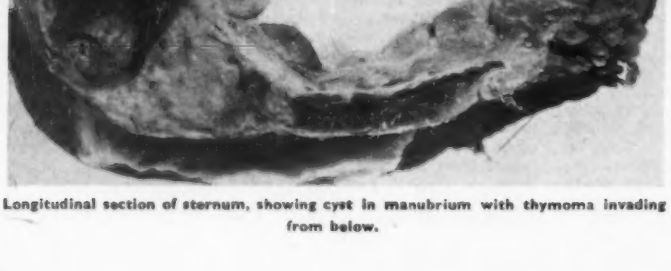
Exploration (Dec. 16).—Through an infra-semilunar incision the wall of the mass—which showed some calcification or ossification—was divided transversely, and its contents removed with a spoon. The intrathoracic portion of the cavity was large enough to admit the index finger and the aortic arch could be felt pulsating behind it.

Report on operation specimen.—"Secondary anaplastic adenocarcinoma. The sections show infiltration with masses of carcinoma cells which in one area have a papillary arrangement. A possible site of the primary is in the lung."

A *further X-ray examination* of the chest, and *bronchoscopy*, showed no sign of primary or secondary growth.

Last Days

The wound healed well but the mass continued to enlarge and its wall thickened so that no further pulsation could be felt. Though he had great difficulty in walking, the patient chose to leave hospital in April, 1955. He had a few weeks' tolerable existence in the sunshine of that amazing summer, but by July the growth was the size of half a grape-fruit, tense and about to burst through the skin. Gross œdema of the left arm developed rapidly, and, whereas tabs. codein co. had been previously sufficient, full doses of heroin were required to ease what would otherwise have been an intolerable end.



Longitudinal section of sternum, showing cyst in manubrium with thymoma invading from below.

Post-mortem Findings

In the upper part of the body of the sternum and the lower part of the manubrium there was a cavity about 2 in. in diameter (see figure). It was lined by shining membrane and contained a little brownish fluid. At the lower border of the cavity the sternum was thickened, and a whitish nodular growth of firm consistence had infiltrated its anterior aspect and the skin covering it. At the back were several nodules, one of which was about 2 in. in diameter and firmly adherent to the mediastinal tissue in the region of the base of the heart. No other primary growth was found in the mediastinum or other organs. Lymph-nodes invaded by the growth were found in the porta hepatis, the para-aortic chains, and the deep cervical group on the left side.

The aorta and its main branches were atheromatous but there was no adventitial thickening or aneurysm-formation. The immediate cause of death was hypostatic pneumonia and toxic myocarditis.

Histologically the retrosternal tumour and the growth within the sternum were composed of large polyhedral and irregular epithelial cells with a reticular arrangement. In some places there were small cysts lined by loose epithelium, and in others broad bands of fibrous stroma separated cellular areas. The large cyst in the sternum had no epithelial lining, but there were groups of tumour cells immediately deep to the lining membrane. The secondary deposits in the lymph-nodes consisted of reticular pleomorphic epithelium. The appearances of both the sternal tumour and the secondary deposits were those of malignant thymoma.

Discussion

There are two main points of interest in this case. The first is that a malignant thymoma presented as a pulsating cystic tumour of the sternum. The second is that the patient had shown a similar clinical picture 53 years previously and had been quite well in the interval.

It would appear that the original diagnosis of aortic aneurysm was mistaken, for there can be no doubt that evidence of such an aneurysm would have been found at necropsy. It is also difficult to believe that the original tumour was a thymoma which regressed and remained quiescent for 53 years.

A possible sequence of events which would link the two illnesses is that the original tumour was a solitary cyst of the sternum into which hæmorrhage occurred. A hæmatoma was formed; this was gradually absorbed; and the cyst remained symptomless until recently a malignant thymoma developed and invaded the body of the sternum and the wall of the cyst. From the original history it seems that at 17 (an unusual age for aortic aneurysm) the patient complained of pain in the affected area, and that some time later a swelling appeared. Both the age of the patient and the pain preceding an obvious lesion are usual for simple bone cysts, and these do sometimes become quiescent and persist without symptoms for many years. It must be admitted, however, that the sternum is an unusual site for a solitary cyst.

In the post-mortem specimen the absence of epithelial lining may be an indication that the cyst was not part of the actual growth but was only invaded by it. Also, the main part of the tumour surrounded the lower half of the cyst only, though microscopic deposits were present in the upper part of the wall.

It is interesting that during the period of growth of the tumour the patient developed a myopathy for which no cause was found at the time.

Summary

A case of malignant thymoma, presenting as a pulsating tumour of the sternum, is described. The patient had had a clinically similar lesion 53 years previously

which was reported as an aortic aneurysm. A possible link between the two illnesses is discussed.

Our thanks are due to Dr. Michael Kremer, Mr. Norman C. Lake, Dr. C. J. C. Britton, Dr. Stewart Russell Reynolds, and Dr. A. C. Thackray, who have, at one time or another, given us the benefit of their advice.

INTESTINAL OBSTRUCTION BY FOOD

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THERE must be few people who have not suffered from small-bowel colic associated with the passage of bulky food masses. It is more unusual for such food masses to impact in the bowel sufficiently firmly to cause obstruction requiring surgical interference.

Ward-McQuaid (1950) reviewed the published reports very fully and found that, in 178 cases of obstruction due to food, persimmons, peaches, and oranges were the most common obstructing agents in that order, although 42 other foodstuffs had also been involved. As he points out, however, the character of the obstructing agent depends largely upon the geographical position of the patient, such exotic foods as grasshoppers, poppy seeds, turtle eggs, and fish scales having been incriminated in distant parts of the world.

Obstruction by impaction of food after partial gastrectomy has been recorded in surprisingly few cases. In 3 previously published cases reviewed by Ward-McQuaid the obstruction was due to orange pith after a Polya type of partial gastrectomy (Allen and Smithwick 1942, Baumeister and Darling 1947, Fleming and Ward-McQuaid 1950), and in a 4th case the obstruction was due to sauerkraut (Seifert 1930). A 5th case (Elfving and Scheinin 1953) was also due to orange pith.

I report 2 further cases here.

Case-reports

Case 1.—A Dutchman, aged 63, was admitted to the Aberdeen Royal Infirmary on May 18, 1955, from his ship which had been near the port when he was taken ill. He spoke no English and his history was difficult to elicit. However, it became clear that he had severe midline upper abdominal pain, of six hours' duration, associated with frequent and increasing vomiting. He had undergone an operation for ulcer one year previously and thought that it entailed removal of his stomach. Since then he had had occasional pain, which he attributed to overeating. His bowels had moved that morning normally.

On examination he was in considerable distress from repeated spasms of colicky abdominal pain. His general condition was fairly good, with pulse-rate 66 and blood-pressure 130/90 mm. Hg. There was pronounced muscular guarding over the upper abdomen but no distension. The abdomen was diffusely tender. No mass could be felt. The bowel sounds were exaggerated, especially during each spasm of pain. Rectal examination was negative. A midline epigastric scar was noted. There was no hernia. About half his teeth were present, and these were in good condition, although the upper and lower molars and premolars did not produce good occlusion on either side.

Radiography of the abdomen revealed multiple fluid levels, which confirmed the diagnosis of small-bowel obstruction. It was thought that this was probably due to adhesions from his previous operation.

At operation on the same day the small bowel was found to be obstructed by a single mass of undigested orange, about midway between the duodenojejunal flexure and the ileocolic valve. The bowel proximal to this was dilated with fluid only, and distally it was empty. No other food masses were present. The bowel was opened, and a mass 2 × 4 in. of unchewed orange was removed, the incision being closed transversely. The appearances in the upper abdomen were those of a retrocolic Polya partial gastrectomy with a full-length anastomosis. The postoperative course was uneventful, and the patient was discharged on May 31.

The obstructing mass was unusually high in the bowel, as would be expected from the short history, and the bolus was not immovably impacted. If it had been left it might well have descended to the terminal ileum before its passage was completely arrested. In most reported cases of obstruction due to oranges the mass has been described as consisting largely of orange pith. In the present case the segments of the orange had not been chewed and their skin was unbroken. Many of the segments were still joined together, as though the orange had been peeled and swallowed in two or three mouthfuls.

Case 2.—A housewife, aged 60, was admitted to the Aberdeen Royal Infirmary on Sept. 21, 1955, with twelve hours' history of colicky abdominal pain. She began vomiting shortly after the onset of the pain, which became increasingly severe and frequent. She brought up large quantities of bile-stained material. Her bowels were regular but had not moved on that day. She said that her stomach had been removed "for a tumour" ten years previously. Shortly after this was done she was readmitted to the ward with acute abdominal pain, which settled under observation. Since then she had had two further attacks (nine years ago and a year ago) for which she was readmitted. No diagnosis was made, and the pain settled soon after admission in each case. Cholecystography was normal.

On examination she was rather obese and unhealthy-looking, with generalised tenderness over the whole abdomen. There was no rigidity, and no mass was palpable. Her pulse-rate was 98 and blood-pressure 160/90 mm. Hg. She was edentulous and had poorly fitting false teeth.

Radiography of her abdomen showed a few dilated coils of small bowel with fluid levels. Small-bowel obstruction secondary to adhesions, was diagnosed.

At operation on the same day a considerable amount of free fluid was found in the abdomen. The small bowel was obstructed by a mass of undigested orange situated about 2 ft. 6 in. from the ileocolic valve and measuring about 3 × 2 in. A second, slightly smaller, mass was present 1 ft. proximal to this. Both masses were extracted through a longitudinal incision in the bowel wall, which was closed transversely. The upper abdomen was full of adhesions; so a clear view of the gastrectomy stoma was not obtained. The patient made a good recovery and was discharged on Oct. 7.

The bolus was impacted in the more common site, at the terminal ileum. The size of the mass and the firmness of its impaction prevented any attempt to milk it onwards into the cæcum. The mass consisted of chewed fragments of orange, mostly pith.

Discussion

These cases are of interest in so far as both patients had previously undergone partial gastrectomy, and in at least one the anastomosis was full-length without incorporating a valve. In both cases the patient's teeth were unsatisfactory, case 1 having poor approximation of his molars and premolars, and case 2 having poorly fitting false teeth. This was probably the immediate cause of swallowing the oranges largely unchewed.

The patients were observed to be in considerable distress both from the severity and frequency of their colic and from frequent vomiting. The obstruction was of necessity complete. It was felt that the symptoms were considerably more severe than might be expected if the obstruction had been caused by a band or an internal hernia; this might be due to the bulk of the mass impacted and to the local overdistension and spasm of the bowel associated with it.

Both patients had complained of transitory abdominal pain following their gastrectomies, in the 2nd case of

sufficient severity to warrant her admission to hospital on three occasions. It seems likely that this may well have been due to a transitory obstruction by undigested food, which passed onwards before the clinical picture became definite.

Although intestinal obstruction following gastrectomy cannot be common, it may perhaps be more common than is generally realised in patients with intermittent pain who are often seen as outpatients after the attack has subsided and are then without abnormal physical signs. After a gastrectomy the muscular action of the stomach on the food is largely lost. In the absence of the pylorus, whose presence would normally protect the terminal ileum from the assault of an excessively large mass within the alimentary canal, it is surprising that obstruction does not occur more often. After a Polya type of gastrectomy the alimentary canal narrows progressively down to the terminal ileum, the physiological screening by the pylorus being lost. According to Samson Wright (1952) the heavier particles of food sink to the lowermost part of the stomach and are not mixed freely with other contents. After gastrectomy the most dependent part of the stomach is usually at the stoma; and, if this is large and unprotected by a valve, the heavier portions of food will pass directly into the jejunum in the state in which they were swallowed. Segmentation movements of the small intestine and digestion are normally sufficient to reduce the larger masses to manageable proportions before the narrower terminal ileum is reached. The provision of a Hofmeister valve, together with a small stoma, of smaller circumference than the jejunum, might therefore be an additional safety factor in performing a gastrectomy.

At operation two methods of dealing with the obstructing masses are available. Enterotomy may be done, or the mass may be "milked" forwards through the ileocæcal valve. In the present cases the masses were too tightly impacted in the bowel to move forwards without risk of damage to the bowel wall. It is logical to suppose that paralytic ileus may be precipitated by such handling of the bowel where the mass is tightly impacted (Storck et al. 1939).

Enterotomy carries little risk, and in the present cases it was possible to make a small longitudinal incision into the bowel and to break up the mass and extract it in pieces with artery forceps. By this means the incision was kept small enough to close transversely, and the bowel lumen was therefore not encroached on.

I wish to thank Mr. G. Gordon Bruce for allowing me to treat and report these cases.

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New Inventions

A REFRIGERATION APPLICATOR

CUTANEOUS lesions are usually refrigerated with sticks of carbon-dioxide snow or a slush made by mixing carbon-dioxide snow with acetone, both at a temperature of about −78°C; with liquid nitrogen at −195°C; or with liquid oxygen at −183°C. The applicator described here, which can be used with all these substances overcomes most of their disadvantages, which are as follows:

Carbon-dioxide Snow

(*a*) A compressed stick of carbon-dioxide snow is blunt and may be applied to a larger area than is intended. This difficulty can be overcome by having a number of compression cylinders of different diameters; or the stick can be "sharpened" by applying it with rotation on its axis to a metal surface so that a cone or truncated cone of snow results.

(*b*) A stick, whether cylinder, truncated cone, or cone, slowly diminishes in diameter through evaporation. This loss in diameter can be lessened by applying the stick in its compression cylinder without expelling it from the end of the cylinder. This entails loss of visual control and loss of pressure on the skin, because it is difficult to maintain steady pressure equally on the cylinder and on the snow contained in it. The plunger must be pressed in gradually as the snow evaporates.

(*c*) If the stick is applied with pressure to an area of skin of uniform consistency while carbon dioxide is being extruded from the compression cylinder, an indented disc of skin will be frozen; the walls of the indentation also become frozen, and in consequence an unnecessarily large area of skin may blister.

Carbon Dioxide and Acetone

(*a*) Carbon-dioxide/acetone slush is not easy to manipulate. Applied on a camel-hair brush or by means of a cotton-wool-tipped wooden applicator, it may accidentally be dropped on to an area of skin that is not to be treated, with painful and embarrassing results. If the mixture drops on to the rayon lining of a coat, solution of the cellulose acetate results.

(*b*) It is difficult to apply carbon-dioxide slush accurately to small lesions.

Liquid Nitrogen and Liquid Oxygen

It is also difficult to apply accurately liquid nitrogen or oxygen, which has to be done with a cotton-wool-tipped applicator.

An applicator to facilitate these operations has been developed by Dr. L. Lortat-Jacob.[1] This consists of inner copper cylinders about $\frac{1}{2}$ in. in diameter and 6–7 in. long surrounded by a 'Bakelite' insulating cylinder. The carbon-dioxide-snow slush is inserted into the copper cylinder and the exposed end is applied to the skin. Cylinders of different shapes and sizes of applicator end are provided. The defects of this instrument seem to be:

1. The heat insulation of the copper cylinder is very inefficient.

2. A much larger area of the copper inner cylinder is exposed to direct contact with the air and/or the patient's skin than is desirable.

3. The mass of the metal and bakelite that must be cooled by the refrigerant is so great that the charge of carbon-dioxide snow normally available would be insufficient to cool it to the temperature of the snow.

4. It would be impracticable to use liquid oxygen or nitrogen in this instrument, because of the poor heat insulation.

An instrument which overcomes these difficulties is shown diagrammatically in fig. 1. It consists essentially of a 'Dewar' double-walled glass flask, with the space between the walls (1 and 2) highly evacuated so that transference of heat through the two walls is greatly reduced. There is a large orifice (3) at the filling end, preferably funnel-shaped as in fig. 1B, and a small orifice (4) at the lower end. Inside this double-walled vessel is a metal member (5) in the form of a cylindrical lining to the inner glass wall, which is integral with a smaller cylindrical stub (6), protruding a small distance through the orifice (4) at the lower end. The projecting stub may be fixed in size (fig. 1A) or varied by screwing on buttons, of different sizes (fig. 1B 10, 11, 12). The metals

1. Lortat-Jacob, L., Solente, G. La cryothérapie. Paris, 1930.

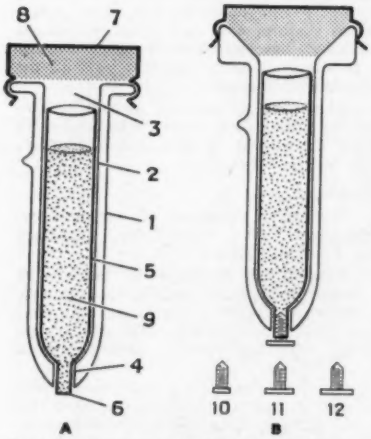

Fig. 1—A, Diagram of instrument. B, Instrument with funnel-shaped filling end and changeable stub.

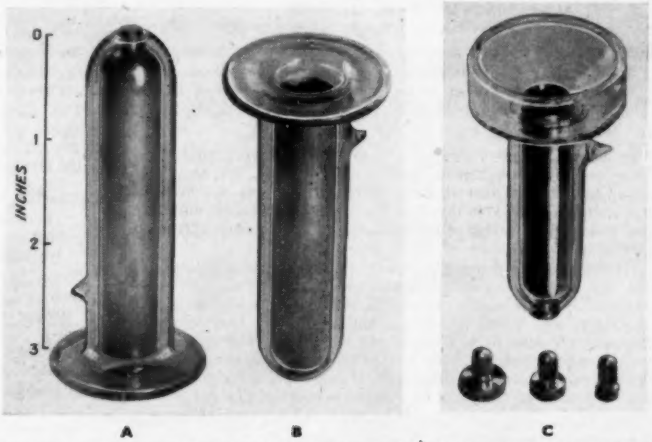

Fig. 2—A, Instrument with application end uppermost. B, Instrument with filling end uppermost. C, Instrument with funnel-shaped filling end and screw-on applicators of different sizes.

used are usually copper or silver because they conduct heat very efficiently.

The metal sleeve fits neatly into the inner glass cylinder. It has not been found possible to make a liquid-tight seal between these two that will survive cooling in liquid air. Hence in using carbon-dioxide-snow/acetone slush a little acetone can, under some circumstances, slowly percolate down between the metal and inner glass cylinders. This is undesirable, but, since the addition of acetone gives no advantage of lower temperature compared with carbon-dioxide snow alone,[2] it is recommended that carbon-dioxide snow only should be used, since then the instrument can be used at any angle without inconvenience or impairment of efficiency.

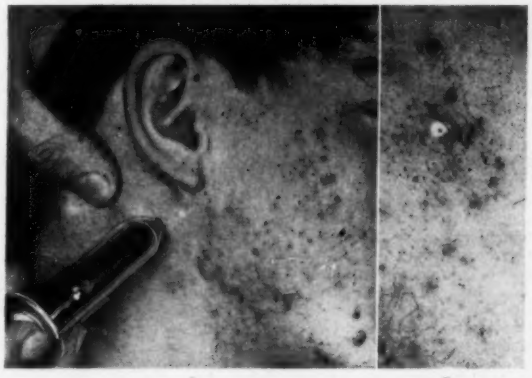

Fig. 3—A, Applicator in use. B, Example of frozen area of skin.

In operation, a charge (9) of carbon-dioxide snow, of carbon-dioxide snow and acetone slush, of liquid nitrogen, or of liquid oxygen is filled into the inner metal cylinder. A good deal will volatilise or boil off in cooling the inner metal and glass parts down to the very low temperatures of the refrigerants. But this is not wasted, since the mass of metal and glass, once reduced to the temperature of the refrigerant, acts as a reservoir of "cold" and does not warm up again for some time. After filling, the upper orifice is covered with a cap (7) that includes a heat-insulating packing (8), which must be designed to allow some escape of the vapourising refrigerant.

Because of the very efficient conduction of heat by the metal sleeve (5), the protruding metal stub (6) is kept very near the temperature of the refrigerant filling the cylinder (5). When this stub is brought into contact with the warm skin the heat is conducted away rapidly enough to freeze the underlying skin. But because of the vacuum shell surrounding the cylinder (5), the outer wall (1) is not uncomfortably cold and can be handled without discomfort. Moreover, since heat cannot enter the instrument at all readily except through the metal stub (6), the instrument remains operative for a considerable time—30–60 minutes, depending on circumstances—after being charged with carbon-dioxide snow. While any of the refrigerant remains in the instrument the temperature of the applicator remains constant. Only when the refrigerant has all disappeared will the applicator begin to return slowly to room-temperature. When the instrument is not in use its lower end should be covered with a rubber cap to minimise condensation of water-vapour and loss of "cold" by contact of the stub with the warm air.

The area treated is approximately equal to that of the end of the metal stub (6). This can be made of different diameters, graduated to suit skin blemishes of different sizes. Alternatively, buttons of different diameters can be screwed on to a fixed stub, thus providing a range of effective sizes from, say, $^3/_8$ to $^1/_{16}$ in. on the same instrument (fig. 1B).

Fig. 2 shows (A) the instrument with the application end uppermost, (B) with the filling end uppermost, and (C) with screw-on applicators of three different sizes and a funnel-shaped filling end.

Fig. 3 shows (A) the applicator in use on a patient with acne vulgaris, and (B) the size of the frozen area of skin. In addition the instrument may be used for treating small warts, keratoses, and other benign lesions.

I wish to thank Dr. L. Carlyle Lyon for the interest he took in the original model; Dr. Brian Russell, physician in charge of the dermatological department, London Hospital, for advice and criticism in the design of this instrument, and for testing the prototype and improved models; and my colleagues at Imperial College, especially Mr. S. Dowden, for invaluable assistance.

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2. Handbook of Chemistry. Edited by N. A. Lange. 8th ed., Sandusky, Ohio, 1952; p. 1222.

Reviews of Books

Thiopentone

And Other Thiobarbiturates. JOHN W. DUNDEE, M.D., F.F.A., R.C.S., lecturer in anæsthesia, University of Liverpool. Edinburgh: E. & S. Livingstone. 1956. Pp. 312. 22*s*. 6*d*.

IN the past ten years a vast amount of work has been done on thiobarbiturate anæsthesia. Now, for the first time, the accumulated knowledge has been set out in one volume. Dr. Dundee has woven into a comprehensive and readable monograph the detailed pharmacology and practical application of these drugs.

He starts with the early history of intravenous anæsthesia and the physical and chemical properties of the thiobarbiturates. Then come three excellent chapters on pharmacology, which will be of continuing interest to workers in the basic sciences as well as to anæsthetists. The rest of the book deals primarily with the clinical use of thiopentone; there are appendices on the practical aspects of administration, with accounts of methods of detection and estimation.

Dr. Dundee has a high standard, which he maintains throughout this book.

Progress in Hematology

Editor: LEANDRO M. TOCANTINS, M.D. Vol. I. New York and London: Grune & Stratton. 1956. Pp. 336. 46*s*.

THIS volume, hopefully labelled number I, is the first of a series intended to give "a periodic survey of the progress of . . . hematologic task forces. . . ." For this survey Dr. Tocantins has enlisted the assistance of 27 contributors, and their contributions range from a long survey covering many pages to a short note recording the results of one treatment in a few cases.

The best article is that by W. W. Zuelzer, J. V. Neel, and A. R. Robinson on the abnormal hæmoglobins; in 47 pages they give a first-class account of the characters of abnormal hæmoglobins so far distinguished, the methods for separating them, their genetics, and the diseases they cause. The article is written in a critical and not an encyclopædic manner, and this is very welcome. Other articles specially worth reading include those by C. C. Ungley and R. B. Thompson on the isolation of the gastric "intrinsic factor" and its relations with vitamin B_{12}, by the late L. A. Erf on a long-term study of polycythæmia vera and its treatment with radioactive phosphorus, by W. J. Harrington, V. Minnich, and G. Arimura, who defend the importance of platelet agglutinins in idiopathic thrombocytopenic purpura, and by T. Bodi, C. Wirts, and L. M. Tocantins who describe an interesting experimental approach to the factors affecting hæmostasis in bleeding from the upper gastro-intestinal tract.

This useful volume is largely complementary to the British *Modern Trends in Blood Diseases*, edited by J. F. Wilkinson, and the fact that only two articles are duplicated—and then not completely—in the two works reflects the multiplicity of topics now covered under the title of hæmatology. Anyone owning these two books will have indeed an up-to-date survey of the field.

Angiocardiographic Interpretation in Congenital Heart Disease

HERBERT L. ABRAMS, M.D., assistant professor of radiology, Stanford University School of Medicine; HENRY S. KAPLAN, M.D., professor of radiology at the school. Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1956. Pp. 233. 95*s*.

THE authors have divided their book into two main sections.

The first covers general considerations, and includes an historical introduction and chapters on technique and equipment, opaque media and reactions, deaths due to angiocardiography, general principles of interpretation, and aortography. This section is concise and clear. Each chapter is followed by an excellent bibliography. All the general information pertinent to angiocardiography will be found in it.

The second section is concerned with the diagnosis of specific anomalies, a chapter being devoted to each. The angiocardiographic appearances are described in detail and illustrated by angiocardiograms of admirable clarity supported by excellent line drawings to aid interpretation. The pathological anatomy, clinical picture, and radiographic features of each condition are briefly mentioned at the beginning of each chapter, which is followed, as in the first section, by an extensive and valuable bibliography.

The authors have produced a concise, accurate, up-to-date, and beautifully illustrated work, which should prove of value to all interested in angiocardiography, both the experienced and the tyro.

Parasites and Parasitism

THOMAS W. M. CAMERON, professor of parasitology, McGill University. New York: John Wiley. London: Methuen. 1956. Pp. 322. 35*s*.

THIS is not a textbook of medical or veterinary parasitology. The author deals with parasitism as a way of living comparable to terrestrial, aquatic, or other modes. The text is written for people with a working knowledge of biology but no special knowledge of parasitology.

It deals successively with the bacteria, fungi, spirochætes, protozoa, viruses, and rickettsias, and the cœlenterates, helminths, ringed worms (annelida), arthropods, molluscs, and vertebrates. The rest of the book discusses the host's reactions against the parasite, parasitism, infectious disease, and the distribution, control, host-specificity, and evolution of parasites. Readers who are not parasitologists will welcome the bibliography, glossary, and outline of the classification of parasites.

Emotional Problems of Early Childhood

Editor: GERALD CAPLAN, M.D. London: Tavistock Publications. 1956. Pp. 544. 42*s*.

THIS book is based upon the papers read at the International Institute of Child Psychiatry in Toronto in 1954.

Section I, on preventive aspects of child psychiatry, includes an interesting chapter on mother-child relationship; and Dr. Caplan contributes a chapter on recent trends. Section II, on "the relation of physical and emotional factors, and problems of hospitalisation," includes a study of the relation between maternal deprivation, psychogenic deafness, and pseudo-retardation by Marie-Cécile Gelinier-Ortigues and Jenny Aubry, of Paris, and a chapter on "the methods of studying children aged one to three years, placed in institutions," by Jenny Aubry. Section III is concerned with the problems of psychosis in early childhood.

Hutchison's Clinical Methods (13th ed. London: Cassell. 1956. Pp. 452. 18*s*. 6*d*.).—For nearly sixty years "Hutchison and Rainy" or, as it later became, "Hutchison and Hunter" has been the trusted friend of all from novice student to gnarled consultant. Now Sir Robert Hutchison, who initiated this evergreen enterprise, has withdrawn, and the latest revision has been undertaken by Dr. Donald Hunter, who has long been a joint author, and by Dr. R. R. Bomford. Together the duumvirate have got off to a good start by making the new edition nearly twenty pages shorter than the last—a feat of zealous editorship that others might take to heart. This work, combining the vigour of youth with the experience of maturity, seems to be assured of at least a further three score years of useful life.

Sigmund Freud (New York: Basic Books. London: Tavistock Publications. 1956. Pp. 150. 18*s*.).—During the celebration of the centenary of Freud's birth, Dr. Ernest Jones delivered three commemorative addresses in the United States. The first of these—on the nature of genius—was summarised in our columns[1] soon after it was given. The three addresses, and a broadcast delivered in London, have now been published as a small book which is aptly rounded off by Dr. Jones's elegiac tribute in the *International Journal of Psycho-Analysis* at the time of Freud's death.

New and Nonofficial Remedies, 1956 (Philadelphia: J. B. Lippincott. London: Pitman Medical Publishing Co. 1956. Pp. 540. 30*s*.).—This valuable annual contains monographs on drugs, evaluated by the American Medical Association's council on pharmacy and chemistry, which are not dealt with in the *Pharmacopœia of the United States* or the U.S. *National Formulary*. Formerly only drugs with established uses were included; but this year all available new drugs are described.

1. See *Lancet*, 1956, i, 698.

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346

THE LANCET

LONDON: SATURDAY, AUGUST 11, 1956

Spread of Antibiotic-resistant Bacteria

WHAT is the evidence that the progressive emergence and spread of antibiotic-resistant bacteria is something more than a bacteriologists' bogy? Since we lately reviewed [1] a small part of the now extensive literature on antibiotic-resistant staphylococci, new information has again demonstrated that the consequences of producing resistant strains of pathogens may be very serious.

In New Zealand the health department is concerned at the mounting cost of free prescriptions issued by general practitioners for antibiotic drugs. During the past financial year their cost has been more than £400,000, which, for a population of some 2 million, is a large sum compared with the £250,000 spent on antibiotics for the $3^1/_2$ million inhabitants of New South Wales.[2] The New South Wales authorities think that even their figure is too high, but the New Zealand expenditure is even more striking than it seems at first sight, because it does not include the cost of penicillin or streptomycin, which are unconditional charges on the health service; nor does the £400,000 include the cost of drugs used in hospitals. But the concern of the New Zealand authorities does not spring solely from financial considerations: they are aware of the dangers of yielding to uninformed public clamour for antibiotics, and they realise that money is being spent with very little justification and very little advantage. Indeed it is the disadvantages that are now becoming apparent. In our last issue Dr. BEAVEN and Dr. BURRY described a hospital outbreak of staphylococcal pneumonia in newborn children in Christchurch, where 8 out of 19 cases were fatal. The clinical and pathological features were remarkably uniform, and the alarming point was the resistance of the causal organism to antibiotics. As the first manifestations were widespread skin lesions, it looks as though minor staphylococcal infections in the nursery must no longer be taken lightly. BEAVEN and BURRY suggest that it is surely more than fortuitous that resistant strains of staphylococci have become a real problem in New Zealand only in the past year—in fact, since the broad-spectrum antibiotics have been available on a doctor's prescription without charge to the patient. It seems that many people believe these drugs are effective against viruses, and patients therefore put pressure on doctors to prescribe them. At all events, the record of the outbreak in New Zealand is another to add to many signs from different parts of the world that antibiotic-resistant staphylococci are not only on the increase but on the march. The situation may be all the worse if HOWE [3] is right in his suggestion that infections with penicillin-resistant staphylococci are more liable to spread than those caused by penicillin-sensitive staphylococci.

In the light of what antibiotic-resistant staphylococci may do to human health, it is necessary to know how other organisms are responding to the increasing use of antibiotics. RANTZ and RANTZ [4] show that during the past five years there has been an increase in the number of antibiotic-resistant strains of staphylococci, *Escherichia coli*, paracolon bacilli, and proteus. Enterococci (*Streptococcus fæcalis*) and pseudomonas are still resistant to most single antibiotics. Hæmolytic streptococci and many non-hæmolytic streptococci have fortunately retained their general sensitivity to antibiotics; it is probably of greater importance that penicillin remains fully effective against hæmolytic streptococci of Lancefield's group A, the chief human pathogen among the streptococci. Even about this, however, recent reports by ROUNTREE [5] and by GRAY [6] are a warning against over-optimism; for penicillin may fail against a sensitive hæmolytic streptococcus in the presence of penicillinase-producing staphylococci. Generally, RANTZ and RANTZ found that there had been a gradual increase of bacterial resistance, especially among organisms responsible for infections acquired in hospital.

In all this, there is perhaps nothing surprisingly new. It is clear that we are not using antibiotics rationally—as we must if they are to confer the enormous benefits of which they are capable without at the same time doing avoidable harm and gradually losing their potency. In these columns we shall continue to state the main facts at every opportunity—to emphasise what might be done if the profession had a mind and a will to do it. Doctors could think twice about using antibiotics at all in most cases in which they are now given; and they could certainly stop at once the administration of any drug that is obviously not effective—say, after three days in most of the common infections and in any case after seven days. Doctors in general practice could resolve to prevent the follies of antibiotic misuse becoming, as in New Zealand,[7] a cause of real anxiety lest antibiotic-resistant infections in the general community should provide a new source of hospital epidemics when the organism is admitted with the patient. Patients (and their relatives and friends) could abandon the twin delusions that every illness needs an antibiotic and will be the better for it. Every doctor could do his utmost to impress on students, colleagues, and friends the potential gravity of the situation. And manufacturers of drugs could do at least as much as anyone—and perhaps more—by resisting the temptation, which must be very real, to use over-persuasive advertising, and by deciding not to market new antibiotics whose clinical advantages are dubious but whose power to induce cross-resistance to existing potent antibiotics is very real.

Methods in Cancer Research

NORMAL cells and aggressive malignant cells have not yet been shown to differ in their chemical properties so clearly as they do in their behaviour in the body. In respect of damage to respiration and excessive fermentation, most tumour cells consistently give results different from the normal; but disagreement about the specificity of these differences still finds expression.[8] In a recent contribution to this subject

1. *Lancet*, 1956, i, 790.
2. *The Dominion*, Wellington, July 6, 1956.
3. Howe, C. W. *New Engl. J. Med.* 1954, **251**, 411.
4. Rantz, L. A., Rantz, H. H. *Arch. intern. Med.* 1956, **97**, 694.
5. Rountree, P. M. *Lancet*, 1955, ii, 172.
6. Gray, J. D. A. *Ibid*, July 21, 1956, p. 132.
7. *Evening Post*, Wellington, June 28, 1956.
8. Greenstein, J. P. Biochemistry of Cancer. New York, 1954; p. 327.

Prof. O. WARBURG [9] says that chemical comparisons of anaerobic glycolysis and respiratory defect have been placed on a quantitative basis; yet here again distinctions between abnormal and normal cells seem less absolute than the distinctions seen in vivo. In making comparisons, chemists have recognised that the methods used have not been all that could be desired. With the old slice technique a cytoma—which is a nearly uniform mass of malignant cells, with only a few thin-walled capillaries—is contrasted with an organised tissue. Normal liver, for example, contains hepatic and bile cells, arteries, veins, lymphatics, nerves, reticulo-endothelium, and connective tissue; yet this organ is often the standard of comparison. Malignant cells may not even be compared with their normal counterparts. Homogenates are unsuitable for analysis because they contain many damaged cells. Malignant cells growing free in the peritoneal cavity in ascitic fluid represent a special adaptation for which there are at present no equivalents among normal cells. In a summary of studies of various collaborating groups of investigators prepared by DEAN BURK at the request of Professor WARBURG,[9] the value of comparing viable monomorphic cells from pure cultures in vitro was emphasised.

This comparison lay between two sublines of fibroblasts which originated from a single normal cell in an old culture. After the twelfth in-vitro transplant generation one subline produced sarcoma in 97% of grafted mice of the strain of origin, and the second subline in only 1% of the same strain over a test period of three years. The malignant transformation seemed to have been spontaneous in that no means were deliberately adopted, apart from subculture, to effect the change.[10] On chemical analysis, the readily grafted subline showed glycolytic values corresponding to those of all cancer cells previously examined, but the other subline had glycolytic values only one-third as high. The rates of oxygen consumption differed conversely and other chemical analyses were in accord. Unfortunately, values for the entirely normal fibroblasts from which these sublines were derived are not included: the same insistence on monomorphic purity does not always extend to the normal counterparts, though many of these can now be cultured in vitro.

Another anomaly in chemical comparisons is the dual assumption that hepatomas are representative malignant growths and that dedifferentiation is the invariable distinguishing feature of malignancy. In respect of malignancy, the status of many hepatomas is questionable, and, examined by light microscopy, they appear to be among the best-differentiated growths. Evidence has lately been found that some are half as well able to synthesise serum-albumin as is normal liver in the same time.[11]

These defects may not turn out to be crucial; but the thirty-third annual report of the British Empire Cancer Campaign contains much evidence of a desire to rectify them; for a number of workers are in continued pursuit of the distinguishing chemical properties of tumour cells. Several contributors have adopted isolated malignant cells as test objects, and these investigators may be assisted by the report that J. G. BENNETTE was able to convert solid into ascitic tumours almost at will. Formerly this type of transformation happened by chance, and usually after many generations of grafting. In 8 out of 13 attempts by BENNETTE, success was attained by suspending a mash of solid tumour in ascitic fluid. The source of this fluid is not stated, but presumably it was free, at source, from malignant cells.

The problem of obtaining viable isolated cell suspensions from pure cell cultures has been tackled by L. M. RINALDINI, who has also studied the cultural conditions which favour growth and differentiation. "Naked" (i.e., isolated) cells were found to be easily damaged by physical trauma. Tyrode solution, as is well known, is a deleterious medium. These observations may account for the anomalous results recorded by L. H. STRICKLAND and J. O. LAWS, who examined the respiration of isolated liver cells obtained by perfusing liver, in situ, with calcium-free saline solution containing citrate or versene. In contrast with all previous results with the old slice technique and newer ones with ascites cells, they found that respiration values were very low. The chemical observations reported include an attempt to study the antigens of pure cell suspensions of normal liver and hepatoma by R. DAOUST. Respiration of isolated macrophages and fibroblasts is being estimated in vitro by a new method by H. HARRIS. A mass of biochemical data is being won through estimations made with carcinoma growing in ascitic fluid by Prof. J. N. DAVIDSON and colleagues. A comparison of physical properties of normal and malignant cells is also in progress. By means of interference microscopy, E. J. AMBROSE, M. ABERCROMBIE, and J. HEAYSMAN, with several colleagues, have found that isolated fibroblasts from cell cultures move actively by wave-like motions and pinocytosis. When an advancing pseudopodium of a fibroblast touched its neighbour, adhesion took place and arrested further movement of the cell borders in contact. The same activity of cell borders was seen in tumour cells; but, when pseudopodia of these cells touched each other, the cell surfaces slid over one another and no permanent adhesion was seen. An increase in electrical charge has been suggested in explanation of this difference in behaviour. This property, if found to be universal, may well be one which allows infiltration and metastasis.

Let Him Be Fit

IT is a pleasant thought that, despite the increasing magnitude of operations, a steadily diminishing proportion of patients are unfit for surgery. But, in their endeavour to make more and more patients fit to be operated on, surgeons have sometimes forgotten their equally important task of keeping themselves fit to operate.

In his "charter of proctology" [1] Mr. HAROLD DODD speaks of three kinds of fitness—physical, mental, and spiritual. "Physically we should be fit," he says, "so that we can ask our patients to aim at a level of health which we ourselves enjoy." To this one might add that physical fitness does more than serve as a model: it is also needed to create the confidence which only the physically strong can inspire in the physically weak. The surgeon who works too hard for too many may be an object of awe to his juniors and of admiration to his fellows; but to his patients he is a source of apprehension. To the sick the sum total of his work matters nothing: their human

9. Warburg, O. *Science*, 1956, **123**, 309.
10. Sanford, K. K., Likely, G. D., Earle, W. R. *J. nat. Cancer Inst.* 1954, **15**, 215.
11. Campbell, P. N., Stone, N. E., Halliday, J. W., Jones, H. E. Thirty-third Annual Report of the British Empire Cancer Campaign. Published from 11, Grosvenor Crescent, London, S.W.1.

1. Dodd, H. *Proc. R. Soc. Med.* 1956, **49**, 125.

egotism inflated by disease, all *they* are concerned about is that the tired look, the sallow complexion, and the irritable manner of their doctor augurs ill for their own future. Though the two are loosely related, it is often mental rather than physical fitness that shows the first signs of decline. The surgeon of today, chain-smoking and sandwich-fed, may be better equipped than his Edwardian predecessor to withstand the rigours of the eight-hour operation, but not always as ready to meet the challenge of the split-second judgment. With skill, even with dash, he gets through the routine parts of the operation; but, when he meets the unexpected, he pauses not to think but to fumble. "We need adequate sleep," says Mr. DODD; "for fatigue contributes to forgetfulness, errors of judgment and irritable reactions. Good literature should be on our desk and at the bedside, the Book of Books amongst them. Reading aloud and memorising poetry is refreshing. Studying professional journals is essential. Participation in the activities of a Society . . . as well as regular travel is necessary. They keep us receptive." Equally important, perhaps, they should keep the surgeon rejective. What has been described as "the pageant of history" has never marched with a more breath-taking speed: the surgeon must march with it and still be able to pause for breath. Mental fitness not only affects the surgeon's judgment of each individual case; it also sharpens or blunts the critical acuity with which he assesses new operations, new gadgets, new theories. May it even be that the prevailing craze for novelty is itself a sign of surgical unfitness?

In industry today there is much—and occasionally illuminating—talk on the importance of providing enough time for leisure; and attempts are sometimes made to transpose the problem, working hours and all, into medicine and surgery. But the work of the surgeon should not be compared to work at the factory bench or the office desk. Hard work though it is, it is not just work; and it is more than an entrancing hobby. Like an everlasting first love, it can fill a hundred lives in one life; and its passion is indivisible into notional half-days. To say that, to keep himself mentally fit, the surgeon needs more time off his work is at most only half true: what he needs is more time in which to do his work properly. Unfortunately, time is a commodity of which he is getting desperately short. "Sound judgment is based on past experience, and we can only acquire it if we use experience to the full; if we study each case long and carefully, and having studied it and made up our mind about it, we commit our views and our decisions irrevocably to paper."[2] To do this is becoming harder, and as a result some surgeons, like the children in SAKI's story, do not learn to know better as they grow older—they merely learn to know more.

The third fitness, that of the spirit, has long defied definition; but, though they may differ in their interpretation, most surgeons will agree with Mr. DODD when he says: "We need an ideology, otherwise we become confused and expediency takes the place of the principles which, in the long run, fails our patients, our fellows, ourselves and our country." In a world where only the stupid can be cocksure, doubt is an important part of the surgeon's equipment. But faith is its essence.

2. Ogilvie, H. *Ann. R. Coll. Surg.* 1956, **18**, 2.

Six hundred years ago GUY DE CHAULIAC defined the surgeon's qualifications thus: "Let him be bold in all sure things and fearful in dangerous things; let him avoid faulty treatments and practices. Let him be gracious to the sick, considerate to his associates, and cautious in his prognostications. Let him be modest, dignified and pitiful." To this noble precept, we should perhaps add today: "Let him be fit."

Annotations

THE NEW MENTAL-HEALTH OFFICER

THOUGH civilisation in its present form necessitates rules and regulations, they are milestones of failure rather than of progress in human understanding. From the time of Moses laws have, with very few exceptions, underlined our distrust of one another and our need for protection from too much freedom. Thus the formidable mass of legislation dealing with the mentally sick and deficient originated as much from the fear and insecurity of the public as from pity for the afflicted. The striking change in the public attitude towards mental disorder that has taken place since these Acts were passed has not only affected the atmosphere of the mental hospitals but has led to the demand for a revision of the Acts themselves. The steadily increasing proportion of voluntary admissions, and the shorter length of stay in hospital brought about by earlier and modern methods of treatment, are directing to prevention and aftercare some of the energies formerly engaged in ascertainment and the machinery of detention.

Those likely to be most affected by these new developments are the mental-health officers of the local health authorities. The contents of the newly published 3rd edition of the *Mental Health Officer's Guide*[1] suggest that these officers are mainly concerned with administering the laws leading to the detention of the mentally sick and defective. But just as a textbook of anatomy is a poor guide to the work of a doctor, so the legal skeleton round which this booklet is written tells us little of the human interest or importance of the mental-health officer's work. The permissive clauses in the National Health Service Act of 1946 which deal with prevention and aftercare are likely to become increasingly important; and, as the authors of this guide point out, success in their application depends on a good many different people helping one another.

Some medical and surgical conditions can be successfully treated on the knowledge of a transverse section of the patient's life: a surgeon does not need to inquire into the school record or family history in order to remove an appendix. But mental illness and many forms of mental deficiency cannot be properly understood and treated without a longitudinal appraisement which takes account of all the facts affecting the patient's illness. It is here that the mental-health officer can give invaluable aid to the psychiatrist, and the more he knows of the antecedents of the patient the better will he be able to assist in the aftercare. In those regions where there is good liaison between family doctors, mental-health officers, mental hospitals, and local social organisations remarkable results are being achieved. It is found that many patients, especially old people, who would have needed admission to hospital can be dealt with in their own homes; statutory powers are rarely needed; and continuity of attention is lessening the risk of relapse.

We must hope that fresh legislation will soon make the present guide out of date, and enable the new edition to contain more applied common sense and less statute law.

1. Mental Health Officer's Guide. By J. SQUIRE HOYLE and T. S. HAWKESWORTH. 3rd ed. Leeds: Elsworth. 1956. Pp. 71. 7*s*. 6*d*.

THE LUNGS IN CONGESTIVE HEART-FAILURE

CHARACTERISTIC changes in the lungs in heart-failure have long been recognised radiologically. Pulmonary œdema due to acute left ventricular failure produces massive shadows radiating from both hilar regions in the form of a fan or butterfly wing, the base and apex of the lung being unaffected.[1] These shadows are caused by extensive transudation of fluid from the capillaries of the lung, and they may persist after the acute heart-failure has clinically resolved. Occasionally the œdema fluid may become thick, gelatinous, or fibrinous, and finally organised, so that the pulmonary shadows may fail to resolve. This has been demonstrated in patients dying of uræmia,[2] and more recently in patients with recurrent episodes of hypertensive left ventricular failure who have been kept alive by hypotensive drugs.[3]

Pleural effusions are common in congestive failure, and they are usually bilateral, but sometimes unilateral (generally left-sided). It is now clear that hydrothorax can occur in pure left-sided heart-failure,[4] although it is most common in combined failure of both ventricles; and it is rare in isolated right-sided failure. Pleural effusion confined to the left side may accompany isolated left-sided failure with sinus rhythm.[5] These effusions are associated with enlargement of the heart and main pulmonary arteries. The lung-fields may be hazy, reflecting pulmonary congestion. In left-sided failure, the chest radiograph may also show horizontal lines in the costophrenic sulcus,[6–8] similar to those seen in mitral stenosis, and probably attributable to interlobular œdema and engorged lymphatics,[9] but not so numerous, well-defined, or persistent as in severe mitral disease. Pleural effusions may be encysted or interlobar, and they may mimic other conditions[10] so that more detailed radiological examination may be needed to localise them accurately. Sometimes such effusions may become partially organised, producing pleural thickening and elevation of the diaphragm.

Short[9] has lately reviewed the radiological appearances in left-sided failure. He studied 51 patients with left-sided failure or left ventricular enlargement unassociated with mitral disease or emphysema. The radiographs of these patients were examined without knowledge of the clinical findings. He detected six types of abnormality due to pulmonary congestion: hilar clouding, pulmonary clouding, hydrothorax (costophrenic or lamellar), interlobar thickening, interlobular (costophrenic) lines, and venous distension in the upper zones. An abnormal pattern was found in 67 radiographs from 30 patients, and the commonest abnormality was hilar clouding. Pleural involvement was noted in 51 films (hydrothorax in 29 and thickening of the fissures in 22). The hydrothorax was bilateral in 17, right-sided in 10, and left-sided in 2. 13 of the 29 patients with hydrothorax had pure left-sided failure and 16 had failure of both ventricles. The type of failure did not appear to influence the localisation of the effusions. There was generally only moderate clouding of the lung-fields, and frank pulmonary œdema was seen in only 2 cases. Costophrenic lines were seen in 20 films, and in 10 they were accompanied by a small effusion. In 13 radiographs there was enlargement of the pulmonary trunk; and pulmonary venous distension was conclusively demonstrated 8 times. Pulmonary congestion was demonstrated radiologically in 7 patients in whom the presence of heart-failure was uncertain clinically. In general, the radiological signs corresponded to the clinical course of the heart-failure, clearing rapidly when clinical signs of failure disappeared. Short considers that careful X-ray examination may permit a diagnosis of congestive heart-failure before clinical signs appear. Certainly his paper is a useful reminder of the value of radiography and fluoroscopy of the heart and lungs in patients with actual or threatened left-sided failure.

1. Jackson, F. *Brit. Heart J.* 1951, **13**, 503.
2. Doniach, I. *Amer. J. Roentgenol.* 1947, **58**, 620.
3. Doniach, I., Morrison, B., Steiner, R. E. *Brit. Heart J.* 1954, **16**, 101.
4. Bedford, D. E. *Lancet*, 1939, i, 1303.
5. Bedford, D. E., Lovibond, J. L. *Brit. Heart J.* 1941, **3**, 93.
6. Kerley, P. *Brit. med. J.* 1933, ii, 594.
7. Shanks, S. C., Kerley, P. Textbook of X-Ray Diagnosis by British Authors. 2nd ed., London, 1951; vol. 2.
8. Fleischner, F. G., Reiner, L. *New Engl. J. Med.* 1954, **250**, 900.
9. Short, D. S. *Brit. Heart J.* 1956, **18**, 233.
10. Newman, W., Jacobson, H. G. *Amer. Heart J.* 1951, **42**, 184.

MYXOMATOSIS

WITH the possible exception of foot-and-mouth disease, no infectious disease of animals has excited wider interest in this country in recent years than myxomatosis in rabbits. The advisory committee set up by the Government considered the effects that any great reduction in the number of rabbits might have on agriculture, forestry, and the trade in fur felt and rabbit meat. In its report,[1] made in 1954, the committee suggested that to restrict the spread of the disease would serve no useful purpose; in other words, myxomatosis should be allowed to run its course. Since then myxomatosis has spread, irregularly but progressively, throughout the country, though not without protests from animal lovers and warnings from animal ecologists about the effect on rabbit predators such as foxes, stoats, and buzzards, which have been deprived of much of their natural food.

Myxomatosis may spread by direct contact between rabbits, but there is much evidence incriminating fleas and mosquitoes as vectors of the disease; and an important method of transmission, at least in Australia, is by mosquito bite. Work on the virus forms of encephalitis has shown that after mosquitoes become infected by ingesting virus-containing blood, the virus multiplies within the insect; and there is a latent period during which mosquito bites do not carry infection. But the concentration of virus in the mosquito rapidly reaches a peak and thereafter does not greatly decrease with time. Workers in Australia[2] have investigated the possibility of a similar course of events in rabbit myxomatosis; but they found that the transmission of myxoma virus differs radically from that of the encephalitis viruses in that myxoma virus does not multiply in the vector but is transferred mechanically by the contaminated mouthparts of mosquitoes which have bitten through the skin lesions of infected rabbits. Moreover, the various species of mosquito differ in their capacity to transmit the disease, and this difference may be related to the biting habits of the insects, the anatomy of their mouthparts, and their propensity for repeated feeding if interrupted. Deep probing and persistent attempts to feed after interruption would undoubtedly favour the transmission of myxomatosis.

Another problem which has been investigated in Australia is the variation in transmissibility between different strains of virus. Fenner et al.[3] concluded that this variation depends, not on the intensity and duration of viræmia, as is the case in encephalitis, but on the extent to which the virus multiplies in the skin of the rabbit and on the average duration of life of infectious rabbits. Several strains of virus have been studied experimentally and in the field, and the survival potential of these strains under field conditions was found to be related to the length of time during which an infected rabbit presents lesions to the insect vectors which may settle upon it. A long illness in a rabbit with extensive lesions will increase the opportunities for insect vectors to feed upon it; and this would explain the present

1. See *Lancet*, 1954, i, 920.
2. Day, M. F., Fenner, F., Woodroofe, G. M. *J. Hyg., Camb.* 1956, **54**, 258.
3. Fenner, F., Day, M. F., Woodroofe, G. M. *Ibid*, p. 284.

dominance in Australia of slightly attenuated strains of virus. In Australia myxomatosis coexists with rabbits (though the rabbit population is greatly reduced), and a similar balance between the disease and the rabbit population may be struck in Europe unless something alters the numbers of insect vectors or their metabolic rate and their consequent incentive to feed.

MESENTERIC OCCLUSION

AORTOGRAPHY performed in the study of peripheral vascular disease often demonstrates that a major mesenteric artery has become occluded gradually and without symptoms. But when the occlusion is more rapid the viability of the gut is threatened and the patient may seek advice because of vague abdominal pains and nausea. The most typical onset of mesenteric occlusion, however, is sudden and dramatic, with severe and persistent pain, vomiting, constipation or diarrhœa (sometimes blood-stained), and profound hypotension. Gordin and Laurent [1] re-emphasise that the diagnosis of mesenteric occlusion is often difficult and in only 5 of the 47 patients they review did the referring doctor diagnose the condition correctly. The diagnosis was particularly puzzling when the infarction had developed insidiously over a few days, and often the true condition was revealed only by laparotomy. When a source of emboli could be found it was reasonable to diagnose embolic occlusion; when there was none, a vascular thrombosis was presumed. As in most other series of mesenteric occlusion, cardiac disease was a common accompaniment: 21 of the 47 patients had auricular fibrillation. Malignant disease was present in 4, and intra-abdominal sepsis in another 4. Gordin and Laurent found that the superior mesenteric artery was involved in 37 out of the 42 cases in which the anatomical site of the occlusion was verified at operation or necropsy. Venous mesenteric occlusions accounted for the other 5 cases.

The mortality in mesenteric vascular occlusion remains depressingly high in patients first seen as an "acute abdomen," and only 3 patients in Gordin and Laurent's series left hospital alive. There are many reasons for this: other emboli are often thrown off at the same time or later; the patients may be very ill from heart-disease or cancer; and often the extent of intestinal damage is in itself fatal.

Attempts at embolectomy or thrombectomy have not been reported in mesenteric-artery occlusion, although post-mortem findings suggest that the operation may occasionally be feasible. The method of treatment favoured by Gordin and Laurent is resection of gut with anastomosis or exteriorisation. But this has many limitations: the patient is often not fit enough to stand a large resection; leakage from anastomic suture lines is not uncommon; and further spread of the thrombosis in neighbouring arteries after the resection is all too frequent. Moreover, large resections of the small intestine result in disturbances of bowel function, impaired nutrition, and severe anæmia, all of which may cause complications in the early or late postoperative period. Gordin and Laurent believe that, even after resection of the intestine, anticoagulants are indicated to prevent the development of new emboli and extension of the thrombosis; and in some cases of massive infarction anticoagulant therapy alone may perforce be adopted. Anticoagulants carry a distinct risk of intestinal or postoperative hæmorrhage, but Gordin and Laurent agree with Murray [2] that anticoagulants should nevertheless be used. Little conclusive clinical data have been offered, however, in support of these drugs, and Laufmann's work [3] on animals showed no difference in the results of resection for mesenteric occlusion, whether heparin was used postoperatively or not.

1. Gordin, R., Laurent, L. E. *Acta med. scand.* 1956, **154**, 267.
2. Murray, G. *Brit. J. Surg.* 1939, **27**, 567.
3. Laufmann, H. *Surg. Gynec. Obstet.* 1942, **74**, 479.

THE LISTER INSTITUTE

THOSE leaving the Chelsea Flower Show or the fun-fair in Battersea Park may sometimes wonder what goes on in the lofty but undistinguished building at the lower end of the Chelsea Bridge Road. Nor they nor many members of our profession know much of the Lister Institute of Preventive Medicine which, under various names but always helped by the beneficence of the Guinness family, has supported medical research for more than fifty years. The annual report of the governing body,[1] unrelieved by illustration or fancy and not very engagingly printed, is in the traditions of the foundation. There is no dramatic revelation of some discovery which will cause immediate change in the prevention, diagnosis, or cure of disease. Equally there is no hint of research for its own or for publication's sake. On every page we read that this worker "is continuing his studies" and that one "has completed a survey." This is not work aimed at random or instigated by whim (as some critics would have it) but a long series of thoughtful attempts to increase our knowledge of pathology in its widest sense. There is no master plan.

The production of smallpox vaccine has for many years been a major activity of the institute, and year by year improvements in method have yielded a more reliable prophylactic. At the other end of the "utility scale" is the work of the director, Prof. A. A. Miles, and his colleagues, on the intimate mechanisms of inflammation and infection. It is nearly a hundred years since the man whose name the institute bears gave his mind to these very problems; but only the very ignorant can yet answer the question "Why have I a pimple on my chin?" Two observations on this problem seem especially noteworthy. Of all the pathogenic organisms which reach the site of infection, very few—and even in some cases only one—invade the tissues. This is done and the subsequent course of the infection is determined within the first four hours, uninfluenced by antibodies or local and general inhibitors of defence reactions.

Bacterial geneticists now recognise the mating of bacteria without putting the word in inverted commas. Dr. B. A. D. Stocker has struck a blow for orthodoxy by showing that the mechanical removal of bacterial flagella immobilises the bacterium but when once it has regrown these appendages it gets under way once more. The long and savage argument about the natural hosts of tsetse flies has been settled in part by a serological examination of their engorged blood by methods similar to those used on anopheline mosquitoes: the results are by no means in accordance with popular expectations and may have some influence on the practice of game conservation in central Africa. The study of blood-groups takes an important part in the work of the institute: not only does it house the reference laboratory and research unit of the Medical Research Council but the chemical basis of blood-groups has for some time occupied much of the time of the biochemical unit under Prof. W. T. J. Morgan, F.R.S. Mrs. E. Klieneberger-Noble, D.SC., the authority on the related but distinct L-forms of bacteria and that group which still has no better name than the pleuropneumonia-like organisms, has extended her studies to the ætiology of non-specific urethritis.

All these are no more than chance samples taken from an imposing catalogue of serious achievement. The same might have been said of many previous reports from this source, and it is a pleasure to find among the list of the staff so many names which have adorned it for so long. There are many too who will read this report with serene recollections of productive but unhurried years spent in the service of "the Lister."

1. Lister Institute of Preventive Medicine: Report of the Governing Body, 1956. Published by the Institute, Chelsea Bridge Road, London, S.W.1.

CAUSE OF PEPTIC ULCER

THE recurring question why some people get peptic ulcers and others do not has been the subject of further inquiry and thought. In a recent study of five children with duodenal ulcer, two aged 9 and three aged 12 years, Chapman et al.[1] discovered emotional problems in each case, and they suggested that these were a significant cause of duodenal ulcer. Of course, this thesis is by no means new, but it must be reconsidered in relation to what is now known about other possible ætiological factors, lately reviewed by Avery Jones.[2] He refers to the work of Mittelmann and Wolff,[3] Moses,[4] and Ruesch,[5] who all regarded childhood influences as important. From a study of 30 patients, Mittelmann and Wolff concluded that in every instance an unstable home background was the cause of the ulcer; and Ruesch found that ulcer-bearers were generally the youngest children in the family. Avery Jones, however, draws attention to Kellock's finding,[6] that duodenal-ulcer patients had the same childhood experiences as the rest of the population. Moreover, Kellock found no evidence that ulcer patients had had more emotional strain than his controls. Other observers, such as Hamilton [7] and Brown et al.,[8] have failed to find any difference in personality between ulcer patients and controls. As for the age of onset, the start of symptoms is often so insidious that it is hard to determine the exact age; but many ulcer patients, particularly those with duodenal ulcers, first have symptoms in early adult life, and sometimes the onset can be traced back to childhood days. Proctor [9] found that in 1·6% of gastric and 2·6% of duodenal ulcers the patients dated the onset of symptoms to childhood. Nevertheless, a large number have no symptoms until late in life; and, where it is possible to relate the annual incidence of new ulcer cases to the population at risk, the incidence in the age-group 60–69, many with short histories, may be as high or higher than in the age-groups 30–39 or 40–49.

Few would deny that psychic factors are an important cause of exacerbation of symptoms, but the picture of an "ulcer personality" is becoming less convincing; for instance, Kapp et al.[10] found the traditional personality in only 6 out of 20 men with duodenal ulcers. As Avery Jones observes, "the thesis that peptic ulcer tends to develop particularly in those who are oversensitive, over-active and over-conscientious rests on insecure evidence." Nor is social class in itself important; for recent surveys [11] have shown that duodenal ulcer is as common in the labourer as in the skilled artisan or the professional and semi-professional man, while gastric ulcer is more common. Studies of constitutional and environmental factors may well prove more rewarding. Avery Jones mentions Levin and Kuchur's finding,[12] that the incidence of ulcers in near relatives is three times as high as in the general population. Doll and Buch [13] demonstrated a similar contrast and showed that relatives of gastric-ulcer patients tended to have gastric ulcers and the relatives of duodenal-ulcer patients had duodenal ulcers. Wright et al.[14] have lately described a striking example of a duodenal-ulcer family in which 9 out of 13 living siblings have duodenal ulcers. Aird and his colleagues [15] showed that peptic ulceration was more common in people of blood-group O than in those of other groups (all 13 in the family studied by Wright et al. were group O). Køster et al.[16] found that group O was associated with higher gastric acidity than group A. On the other hand, Peebles Brown et al.[17] could demonstrate no correlation between acid output and blood-group in ulcer patients. The increased susceptibility of group-O patients may apply to duodenal and not to gastric ulcers.[17–19] Again Hunt and Kay's work [20] suggests that duodenal-ulcer patients with hypersecretion have a greater secretory-cell mass than the normal individual. While these facts suggest a constitutional factor, it may be that they indicate, at least in part, family habits.

Referring in 1885 to gastric ulcer, Welch [21] remarked that "the disease seems to be somewhat unequal in its geographic distribution but the data bearing on this point are altogether insufficient." Since that time, evidence has accumulated to show that peptic ulceration varies strikingly in different races and in different parts of the world. This difference is not confined to large land masses, but can be seen between urban and rural populations in this country and in Denmark,[22] for example, and between Northern and Southern Nigeria.[23] Doll et al.[11] found a low incidence in agricultural workers, and Morris and Titmuss [24] showed that the mortality-rate for peptic ulcer in men was approximately 75% higher in the County of London than in the rural areas of England and Wales. At first sight, this difference seems to support the psychosomatic hypothesis, since the way of life of a highly industrialised area still differs so greatly from that of the quieter rural areas. But there is also a difference in closely related urban and rural areas, where there is no big difference in the tempo of life. These differences may reflect environmental factors, in the form of family habits, and particularly food habits, rather than childhood influences or the extra stress of urban life.

THE REMUNERATION CLAIM

REPRESENTATIVES of the Negotiating Committee met the Minister of Health (Mr. Robin Turton) and the Under-Secretary of State for Scotland (Mr. J. Nixon Browne) on Aug. 1 about their claim for increased remuneration on behalf of general practitioners and all grades of hospital medical staff. The meeting was adjourned pending submission by the committee of further particulars as to the legal aspects of their claim.

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2. Jones, F. A. *Ann. intern. Med.* 1956, **44**, 63.
3. Mittelmann, B., Wolff, H. G. *Psychosom. Med.* 1942, **4**, 5.
4. Moses, L. *Ibid*, 1946, **8**, 405.
5. Ruesch, J. Duodenal Ulcer. Berkeley, California, 1948.
6. Kellock, T. D. *Brit. med. J.* 1951, **ii**, 1117.
7. Hamilton, M. *Brit. J. med. Psychol.* 1950, **23**, 182.
8. Brown, M., Bresnahan, T. J., Chalke, F. C. R., Peters, B., Poser, E. G., Tougas, R. V. *Psychosom. Med.* 1950, **13**, 1.
9. Proctor, O. S. *Surg. Gynec. Obstet.* 1925, **41**, 63.
10. Kapp, F. T., Rosenbaum, M., Romaro, J. *Amer. J. Psychiat.* 1947, **103**, 700.
11. Doll, R., Jones, F. A., Buckatzsch, M. *Spec. Rep. Ser. med. Res. Coun., Lond.* 1951, no. 276.
12. Levin, A. E., Kuchur, B. A. *Proc. Mazim Gorky med. genet. res. Inst.* 1936, **4**, 181.
13. Doll, R., Buch, J. *Ann. Eugen., Lond.* 1950, **15**, 135.
14. Wright, J. T., Grant, A., Jennings, D. *Lancet*, 1955, **ii**, 1314.
15. Aird, I., Bentall, H. H., Mehigan, J. A., Fraser Roberts, J. A. *Brit. med. J.* 1954, **ii**, 315.
16. Køster, K. H., Sindrup, E., Seele, V. *Lancet*, 1955, **ii**, 52.
17. Peebles Brown, D.A., Melrose, A. G. Wallace, J. *Brit. med. J.* July 21, 1956, p. 135.
18. Clarke, C. A. See *Lancet*, 1955, **i**, 544.
19. Westlund, K., Heistö, H. *Brit. med. J.* 1955, **i**, 847.
20. Hunt, J. N., Kay, A. W. *Ibid*, 1954, **ii**, 1444.
21. Welch, W. H. Pepper's System of Medicine. Philadelphia, 1885; vol. II, p. 480.
22. Alsted, G. Incidence of Peptic Ulcer in Denmark. Copenhagen, 1953. See *Lancet*, 1953, **ii**, 444.
23. Konstam, P. G. *Ibid*, 1954, **ii**, 1039.
24. Morris, J. N., Titmuss, R. M. *Ibid*, 1944, **ii**, 841.

THE INDEX and title-page to Vol I, 1956, which was completed with THE LANCET of June 30, is to be issued next week. A copy will be sent gratis to subscribers on receipt of a postcard addressed to the Manager of THE LANCET, 7, Adam Street, Adelphi, W.C.2. Subscribers who have not already indicated their desire to receive indexes regularly as published should do so now.

Conferences and Congresses

INTERNATIONAL CONGRESS OF PÆDIATRICS

THE Eighth International Congress of Pædiatrics was opened by Queen INGRID in the Frederiksberg City Hall, Denmark, on July 22. In a delightful address of welcome, in French and English, she spoke of the good fortune of those mothers who could obtain comfort and advice when their children were ill, and she expressed the wish that mothers all over the world could be equally fortunate.

Prof. PREBEN PLUM, president of the congress, reviewed the history of the International Congresses of Pædiatrics, the first of which had taken place in Paris in 1912. There had been a previous international meeting of children's physicians in Denmark. The famous Professor Hirschsprung was president of the pædiatric section of the International Congress of Medicine held in Copenhagen in 1884; and Dr. Thomas Barlow had been one of the speakers at that meeting.

The 1956 congress was attended by almost 3000 pædiatricians from 61 countries. In addition there were enrolled 1000 associate members, wives and other members of doctors' families, to enjoy the varied social activities.

Chemical Agents

Fluoridation of Drinking-water

Dr. HENRY F. HELMHOLZ (U.S.A.) put a convincing case for the fluoridation of drinking-water, where natural concentrations were low. Fluorine added in one part per million had no harmful effects and reduced dental caries by more than 60%, this protection lasting well into middle age.

Reactions to Antibiotics

Dr. HARRY SHWACHMAN (U.S.A.) described staphylococcal pseudomembranous enterocolitis and disseminated moniliasis complicating tetracycline therapy. The dangers of chloramphenicol had been exaggerated. Despite reactions, often due to injudicious use, the antibiotics remained "wonder drugs."

Dangers from Industrially Manufactured Foods

Dr. PAUL GYORGY (U.S.A.) remarked that this subject was increasingly important and warranted the establishment of a permanent committee of the International Congress in liaison with the World Health Organisation.

Prenatal Injuries and Malformations

Effects of Atomic Explosions

Dr. MAURICE LAMY (France) analysed the effects on pregnant women of the explosions at Nagasaki and Hiroshima. Abortions, stillbirths, and malformed births were likely only if the mother herself had been harmed by the explosion. Seven of eleven mothers exposed to the effects of the explosion at Hiroshima during early pregnancy gave birth to microcephalic infants.

Dr. JAMES V. NEEL and Dr. WILLIAM SHULL (U.S.A.) had studied the potential genetic effects of the atomic bomb by means of detailed questionaries from which they received information about 93% of the births in Nagasaki and Hiroshima between 1946 and 1955. On the whole the analysis failed to indicate significant connection between irradiation of fathers or mothers and subsequent abnormal births. A slight increase in stillbirth-rate and neonatal death-rate in mothers heavily irradiated might be due to somatic rather than genetic damage.

Prenatal Infections

Dr. JOSEPH STOKES, jun. (U.S.A.), reviewed the teratogenic effects of prenatal infections. Maternal vaccinia and toxoplasmosis, as well as rubella, might cause malformation in embryonic development. Ingalls had estimated the incidence of congenital defects following maternal rubella in the first three months of pregnancy to be as low as 15% and in the second three months as high as 11%.

Pathology of the Newborn: Anoxia

Mechanism of Anoxia

Dr. CLEMENT A. SMITH (U.S.A.) said that the fœtal cells were presumably geared to optimal activity at an arterial pO_2 of 50–60. The fœtus might exist close to the brink of critical anoxia, but it was equally probable that, owing to special adaptive mechanisms, the margin of safety was as wide as in extra-uterine life.

"Fœtal Cradle"

Dr. A. P. BLOXSOM (U.S.A.) showed a lantern-slide of his "fœtal cradle," which confers eight distinct advantages on the newborn baby.

Pathological Anatomy of Anoxia

Dr. J. EDGAR MORISON (Northern Ireland) discussed the problems faced by the pathologist in trying to obtain post-mortem evidence of events before and during birth.

Oxygen Therapy

Prof. MARCEL LELONG (France) reviewed the value and risks of oxygen therapy in the newborn.

Psychiatry

Neurosis

Dr. D. W. WINNICOTT claimed that neuroses were a sign of health as well as ill health, because they at least indicated the capacity for emotional relationships with other persons. Treatment was required only if they proved incapacitating for the child, boring for the parents, or inconvenient to the family circle. The psychoses had their origin in earlier life. The prevention of mental-hospital illness lay in the hands of the pædiatrician, if he did but know it; it could safely be said that he did *not* know it, and his life was thereby the sweeter. Most pædiatricians were "good with children"; but this was not psychology, and a pædiatrician who wanted to be a psychiatrist should undergo psycho-analysis himself. He asked pædiatricians to respect psycho-analysis even if they disliked it.

Dr. PEDRO DE ALCANTARA (Brazil) suggested simpler explanations, in terms of parental mismanagement. He spoke effectively of neuroses as seen by the pædiatrician rather than the psychologist.

In the discussion Dr. V. H. M. FONTES (Portugal) recommended that every pædiatrician should receive training in psychology, even if he did not intend to undertake psychological treatment.

Prevention of Accidents

Dr. RONALD MAC KEITH presented the prevention of accidents in childhood as a challenge to pædiatricians and indicated some of the ways in which a better understanding of these serious causes of mortality is required.

Neurology

Treatment of Hydrocephalus

Dr. DONALD MATSON (U.S.A.), who based his remarks on 210 personal cases, said that only in those children with communicating hydrocephalus detected early in life in whom lumbar-arachnoid/ureteral shunts could be performed was there a reasonable chance of a highly successful outcome. His series included no less than 60 such good results.

Long-term Care of Cerebral Palsy

Dr. RANDOLPH K. BYERS (U.S.A.) read a paper by himself and Dr. BRONSON CROTHERS, based on their many years' experience. Their analysis of the eventual outcome, in terms of competitive status in adult life, of many hundreds of affected children studied from early childhood or infancy was of absorbing interest. The cerebral palsied child should receive adequate medical and psychological appraisal and, if need be, orthopædic

treatment, acceptance of his condition by his parents, and provision of emotional and sensory experience. Preoccupation with motor defects would prove unrewarding.

Kernicterus

Dr. L. K. DIAMOND (U.S.A.), in a paper read by Dr. J. A. Wolff, observed that there is now a 94% recovery-rate in liveborn babies treated for hæmolytic disease of the newborn at the Boston Lying-in Hospital, and there have been no cases of kernicterus for several years. 80% of affected babies received exchange transfusion, and 25% multiple exchanges. Kernicterus was now mainly a danger in small premature babies without hæmolytic disease. He cited a recent study in New York in which deaths from kernicterus were shown to be six times as common in a group of small prematures treated prophylactically with sulphafurazole ('Gantrisin') (150 mg. per kg. body-weight daily) and penicillin as in a group receiving prophylactic oxytetracycline. It seems that gantrisin as well as 'Synkavit' in high doses is a factor in producing kernicterus of prematurity, but Dr. BERYL CORNER pointed out that this complication of prematurity may occur in the absence of any drug treatment.

Cerebral-palsy Syndrome

Mrs. EIRENE COLLIS reported with Dr. W. R. F. COLLIS and Dr. DAVID LAWSON the finding of "identical" physical signs in 31 infants exhibiting a cerebral-palsy syndrome which may follow prolonged neonatal jaundice (kernicterus) and similar clinical pictures (notably "variable rigidity") at each stage of their development.

Dr. RONALD MAC KEITH did not think that this syndrome could be sharply differentiated from other athetoses and pointed out that kernicterus was a sequel of intense, but not necessarily prolonged, jaundice in the neonatal period.

Immunisation against Poliomyelitis

Live Vaccines

Dr. ALBERT B. SABIN (U.S.A.) reported on the present status of work on immunisation of human beings with living attenuated poliomyelitis viruses. Attenuated strains of each of the three types of poliomyelitis virus had now been produced in his laboratory which were (1) stable, (2) not paralyticogenic in man or monkeys, (3) capable of multiplying in the alimentary tract, and (4) able to produce satisfactory antibody responses. Immunising strains were grown from single virus particles to achieve homogeneity. Immunisation with living viruses would probably be a practical procedure in the near future.

Natural Antibody Levels

Dr. JAMES GEAR (South Africa) gave an interesting account of the natural antibody levels in people of different races and localities and of the result of vaccination against poliomyelitis with formalinised vaccine in his country.

Dead Vaccines

Dr. DAVID BODIAN (U.S.A.) reviewed immunisation with dead vaccines in the U.S.A. New and more stringent tests for inactivation of the virus were now used. On the question of the effective duration of immunity he showed that booster doses at six months and two years produced satisfactory antibody responses. He reported a paralysis-rate of 29 per 100,000 in the unvaccinated, compared with 6 per 100,000 in the vaccinated.

In the discussion which followed, Dr. H. MOMMSEN (Germany) suggested that the natural bacterial flora of the mouth and throat might protect against virus disease.

Dr. JOSEPH STOKES, jun. (U.S.A.), drew attention to the fact that paralytic illnesses could still occur in persons vaccinated with formalinised vaccine and that the total incidence of paralytic poliomyelitis in the U.S.A. had not fallen with the introduction of vaccination. Doctors were inclined not to report non-paralytic poliomyelitis in the vaccinated. Experiments in human passage of attenuated living virus showed no increase in virulence.

Dr. C. E. CASTILLO (Venezuela) said that mass vaccination was planned to take place this year in his country.

Dr. HERDIS VON MAGNUS (Denmark) reported that 98% of children aged 7–12 years were vaccinated in April, 1955, and have now received third injections. This year vaccination had been extended and had already been carried out in 67% of the population of Denmark below 40 years of age. So far there had been one case of paralytic poliomyelitis this year—and this in an unvaccinated person.

Allergy

Dr. JOHAN E. G. SCHOOK (Holland) reported a thorough study of infections in a large group of asthmatic children treated in a residential centre. Bacterial infections of the bronchi and lungs were very common, but did not provoke asthmatic attacks and occasionally even suppressed them. It seemed doubtful whether bacterial allergy existed.

Dr. ZAÏDA ERIKSSON-LIHR (Finland) took the opposite view and recommended eradication of septic foci in asthmatics.

Dr. F. ESCARDO (Argentina) considered that asthma was a form of neurovegetative epilepsy.

Tropical Pædiatrics

Dr. S. T. ACHAR (India) spoke of the ætiology, clinical aspects, and pathology of *kwashiorkor*, and in the discussion the effects of protein malnutrition were described by pædiatricians from other tropical countries including the Philippines, Indonesia, and Cuba.

Prof. A. AGUIAR (Brazil) gave an interesting and well-illustrated account of the form of trypanosomiasis endemic in his country—*Chagas' disease*.

Prof. P. C. C. DE SILVA (Ceylon) spoke on *Tropical ascariasis* and showed that roundworm infestation was a serious problem in lands where overcrowding, poverty, and malnutrition are common. Heavy infestations causing serious impairment of health occurred. Piperazine was the most effective drug.

Tuberculosis

Vaccination in Infancy

Dr. G. SALVIOLI (Italy) recommended the use of a killed tuberculous vaccine in early infancy, when the danger of infection was greatest.

B.C.G. Vaccine

Prof. ARVID WALLGREN (Sweden) reviewed the use of B.C.G., which was a valuable prophylaxis against the immediate consequences of tuberculous infection, although its preventive influence on late manifestations was doubtful. He considered the recent British Medical Research Council trial the best study of its value. The need for mass vaccination would decrease in countries such as Sweden with a progressive decline in tuberculosis.

Primary Tuberculosis

Prof. ROBERT DEBRÉ (France) recommended drug treatment of primary tuberculosis with symptoms certainly in infancy and at puberty and probably at ages between. Isoniazid and *p*-aminosalicylic acid should be given for six to eight months.

Tuberculous Meningitis

Dr. SEYMOUR HEYMANN (South Africa) reviewed the treatment of tuberculous meningitis and recommended the routine use of corticotrophin.

Medical Education

The many further papers included one by Dr. GERRIT H. M. VEENEKLAAS (Holland), who had surveyed undergraduate medical education throughout Europe on behalf of the World Health Organisation. He contrasted unfavourably the persistence on the Continent of the hierarchical system of teaching, with its dependence on formal lectures, with the free discussion permissible between British students and their teachers and the value attached in Britain to clinical training in wards and outpatient departments. He thought that, because of the careful planning of pædiatric teaching in this country, British pædiatrics would probably lead the world for the next three decades.

These remarks were received with concern by at least one senior European pædiatrician, who thought that the great professor played a valuable part in medical education.

Conclusion

Although some criticism of international congresses was heard, there was nothing but praise for the way in which Professor Plum and his colleagues had organised this congress, which, in the words of Prof. ALAN ROSS, president-elect of the next congress, to be held in Montreal in 1959, should serve as a model for all future congresses. The organisation of the Copenhagen meeting has occupied all the spare time of Dr. Jørgen Vesterdal, the secretary-general, Dr. Torben Jersild, his deputy, and many other Danish pædiatricians for the past three years.

Special Articles

FLOUR AND BREAD

THE Government have now given effect to their decision [1] to act on the main conclusion of the Cohen Panel,[2] and to abolish the bread subsidy [3] and the control of bread prices. The following statutory instruments come into force on Sept. 30.

The Flour (Composition) Regulations, 1956 (S.I. 1956 no. 1183)

These regulations, made under the Food and Drugs Act, 1955, apply to England and Wales. They provide that all flour intended for human consumption, whether home-produced or imported, shall on sale, offer for sale, or exposure for sale contain not less than 1·65 mg. of iron, 0·24 mg. of vitamin B_1, and 1·60 mg. of nicotinic acid or nicotinamide per 100 g., and, except in the case of flour containing the whole of the products derived from the milling of wheat, 235–390 mg. of creta præparata per 100 g. Exemption is provided for certain prescribed purposes. The regulations will be enforced by food and drugs authorities.

The minimum quantities of vitamin B_1, nicotinic acid, and iron are the same as those prescribed in the Flour Order, 1953, for addition to flour of an extraction-rate of less than 80%, and the mean level for added calcium is the same as the addition prescribed in that Order.

Corresponding regulations will be made for Scotland under the Food and Drugs (Scotland) Act, 1956. In Northern Ireland, by agreement with milling and flour-importing organisations, the flour available will conform with the composition prescribed for Great Britain pending legislation for Northern Ireland.

The Flour (Revocation) Order, 1956 (S.I. 1956 no. 1182)

This order revokes the Flour Order, 1953, which defined national flour as flour of 80% extraction or the equivalent, and required the addition of iron, vitamin B_1, and nicotinic acid to all flours of lower extraction. The addition of creta præparata was also compulsory except in the case of flour containing the whole of the products derived from the milling of wheat.

The Bread (Amendment no. 2) Order, 1956 (S.I. 1956 no. 1181)

This order abolishes the provisions of the Bread Order whereby bread made from national flour has been known as national bread and has been sold at a controlled subsidised price. The order continues the present requirement in the Bread Order that loaves of over 10 oz. must weigh 14 oz. or a multiple of 14 oz.

1. See *Lancet*, 1956, i, 810.
2. Report of the Panel on Composition and Nutrition Value of Flour. Cmd. 9757. H.M. Stationery Office, 1956. See *Lancet*, 1956, i, 800.
3. See *Lancet*, 1956, i, 517.

CENTRAL HEALTH SERVICES COUNCIL

As the advisers of the Minister of Health, the council have during the past year [1] had before them several important points where preventive medicine has touched the citizen more sharply than usual—smoking and lung cancer, the use of poliomyelitis vaccine, and the fluoridation of domestic water-supplies. After a favourable report from a special committee of the council, a pilot vaccination scheme was started in May and June, ahead of the probable seasonal rise in poliomyelitis. The report carries the record of the council's views on smoking and cancer of the lung only to the end of 1955, when they still felt that centrally directed publicity drawing the public's attention to the existing evidence of a causal connection between smoking and lung cancer was undesirable. But in his preface the Minister explains that by the spring the council thought that enough evidence had accumulated to justify a public statement. Accordingly on May 7 he announced in the House of Commons [2] that two known cancer-producing agents had been identified in tobacco smoke, but that research had not yet proved whether they had a direct rôle in producing lung cancer. The Minister added that he would keep the public informed of all relevant information, but he did not think that our present knowledge justified him in accepting the council's further advice to start a national publicity campaign.

The council reviewed the possible effects of adding fluoride to the public water-supplies at not more than 1 part per million. They are satisfied that there is no medical evidence of any risk from drinking-water containing fluoride in that concentration. But they recognise that the ethical issue remains whether a local authority is justified in treating the public water-supplies, when it may be difficult or impossible for any dissenting citizen to avoid using the supply. In their view the safeguard of the individual's true rights lies "in ensuring that any decision made by an authority is taken in compliance with proper constitutional procedure and in the light of well-informed opinion." By initiating trials in selected areas the Government has taken steps to ensure full opportunity for well-informed opinion to develop.

Mental-hospital Problems

The council, through the Standing Mental Health Advisory Committee, also inquired into the shortage of doctors in mental and mental-deficiency hospitals. They estimate the over-all shortage at 20% of establishments. The difficulty of filling the post of medical superintendent they attribute largely to "inadequate recognition of its additional responsibility." They recommend that courses of training in medical administration should be started. Another outstanding reason for the failure to recruit staff, particularly to the registrar and junior grades, is, they believe, the shortage of houses and flats for married doctors, and they recommend that priority should be given to providing accommodation for some members of each medical grade, particularly in isolated hospitals. The council also hold that training facilities are often unsatisfactory, and suggest that reciprocal training arrangements between teaching and regional hospitals could be expanded and links with the universities strengthened. They draw attention to the fact that some universities have no chair of

1. Report of the Central Health Services Council for the year ended Dec. 31, 1955. H.M. Stationery Office. Pp. 41. 1s. 9d.
2. See *Lancet*, 1956, i, 696, 678.

psychiatry. Owing to the scarcity of psychiatric consultants some senior registrars have been accepted for consultant posts before completing the full period of training; others have abandoned their training to accept S.H.M.O. posts. If enough senior registrars are to complete training the establishment should, the council recommend, be expanded.

A few weeks ago a report was published from a subcommittee on the medical care of epileptics, which will be discussed further in our editorial columns. The council believe that the colonies should ultimately become part of the National Health Service like other hospitals. As a short-term measure they recommend that hospital boards should make contractual arrangements with the colonies.

Mothers and Babies

During the past year the Standing Maternity and Midwifery Advisory Committee, with the Ministry, have been studying antenatal care related to toxæmia of pregnancy, which is clearly the principal cause of maternal deaths and an important cause of stillbirths and neonatal deaths.

The council consider that the time has come for a concerted effort by all three parts of the maternity service to tackle this problem. After setting out what should be comprehended in good antenatal care they say that, once toxæmia has been recognised, the three essentials are: (1) a constant watch on all patients, especially non-attenders; (2) adequate numbers of antenatal beds so that treatment may be started as early as possible; and (3) for the multipara a good home-help service. Furthermore the number of antenatal beds should be related to the needs of the population served and not to the number of lying-in beds. What is required, in the council's view, is not so much the establishment of new services as a proper use of those that already exist.

The Minister has arranged for this part of the report to be discussed locally between representatives of family doctors, hospital obstetricians, and local health-authority medical staff.[3] He has also referred to the hospital authorities the council's views on the care of babies in maternity hospital [4] and the Standing Medical Advisory Committee's resistance to the objections raised by a few hospitals to the introduction of daily visiting for child patients.

3. *Ibid*, p. 954.
4. *Ibid*, 1955, ii, 1239

Before Our Time

A NORWICH SURGEON'S DIARY

AMONG provincial surgeons of the first half of the 19th century, John Green Crosse, the lithotomist (1790–1850), who practised at Norwich for almost thirty-five years, was an outstanding figure; he achieved not only national, but even international, repute. This is what gives special interest to the discovery, not so long ago, of a large number of Crosse papers and documents preserved at Norwich Public Library, including no fewer than six full diaries as well as a number of letter-books.

The Crosse diaries, which are still entirely unpublished, cover the whole of the diarist's professional life from the day when, at the age of 15, the young man was placed as an apprentice with the local practitioner at the little market town of Stowmarket, dusting the surgery and preparing pills, until a few years before his death in 1850 when he was the senior surgeon of the Norfolk and Norwich Hospital, a fellow of the Royal Society and of the College of Surgeons, hon. M.D. of the Universities of Heidelberg and St. Andrews, and one of the founder members of the Pathological Society.

Crosse, the son of a yeoman farmer, was a self-made man who took his career extremely seriously. From the almost daily entries in his diary, where he recorded with infinite care—and, fortunately, a very clear hand—every stage of his training and of his own practice, the countless operations which he saw performed or performed himself, and every other unusual scrap of professional information which came his way, it is possible today to gain an outstanding picture of the minutiæ of a surgeon's life a century and a half ago.

At the age of 21, upon the expiry of his apprenticeship, Crosse came to London "to walk the hospitals there"; he went to live as a pupil at the house of Charles Bell, the greatest anatomist of his day, and became a student at St. George's. He was exceptionally fortunate in coming into contact, often on terms of personal friendship, with many of the famous surgeons of his day whom he met in Bell's house, and from the outset he filled his notebooks with details of their conversation and of the cases and operations of high interest which he saw in London hospitals. In 1813, he "passed the College of Surgeons" and proceeded for a year to Dublin University to act as demonstrator to Dr. James Macartney there. A scheme to settle down in Ireland as eye specialist failed, and, after taking the advice of his teachers in London, Crosse decided to establish himself if possible at Norwich, where Edward Rigby, the famous physician, had promised him his support.

Before proceeding to Norwich, however, Crosse took advantage of the short interlude of peace between Napoleon's banishment to Elba and his triumphant return in 1815 to undertake a short visit to Paris so as to study medical institutions there. To this visit, which lasted barely ten weeks but fills some 400 closely written pages in Crosse's diary as well as two smaller manuscript volumes entitled "Letters from France" (which at one stage must have been intended for publication), we owe many interesting sidelights and comparisons between medical training in England and France at the beginning of the 19th century. Crosse carried letters of introduction to a great number of French medical men, including Beclard, Roux, Cuvier, and Dupuytren, and made the very best use of them. He attended the Charité and the Ecole de Médecine each morning and afternoon, heard Baron Dupuytren lecturing on hernia to 1200 students, and attended Roux and others almost daily at operations. The first-hand insight which he thus gained was by no means always favourable; but, while he felt that in certain of their surgical methods the French were almost a hundred years behind England, there were other aspects, such as the organisation and arrangements in French hospitals and institutions, which filled him with almost unqualified admiration.

Back in England Crosse wrote a lengthy pamphlet, "Sketches of the Medical Schools of Paris, including Remarks on the Hospital Practice, Lectures, Anatomical Schools and Museums, and exhibiting the actual State of Medical Instruction in the French Metropolis," which is full of valuable comparisons, not least where he draws attention to "Médecine légale—a branch of medical knowledge particularly cultivated in France and which is almost forgotten in London." A separate notebook filled many years later with observations and investigations into the state of mind of "one William Frost of Whitwell who murdered his four infant children on Monday, 8th April, 1844" shows that throughout his long and extremely busy life Crosse retained his interest in this aspect of medicine.

There are among the documents at Norwich Public Library other manuscript studies and medical papers composed by the surgeon in the spare hours of an outstandingly successful professional career, including a study of vaccination based on personal experience around 1820 and a fragmentary "Essay on Feigned Diseases." But

the value of the Crosse papers and diaries to the historian of medicine and to the social historian lies above all in the detail of his daily professional entries and in the evidence of his multifarious activities at Norwich.

Apart from his daily surgical work at the hospital which he describes fully, Crosse took an increasing interest in the training and teaching of pupils and apprentices. He lectured himself on pathology and other subjects and worked hard and successfully to build up a medical school at the Norwich and Norfolk Hospital. Eventually he was called upon to give evidence to the Select Committee of the House of Commons when, in the '40s, it examined the state of medical education in this country.

To conclude this short account which, it is hoped, will attract further and more detailed study of these diaries, let me quote Crosse's remarks when late in life, and with justifiable pride, he looked back on his career: "The choice of my profession," he writes, "was the great step which brought me knowledge, enjoyment and advancement in the world." And again: "There are several ways of getting on in practice and he succeeds best and to the highest pitch who combines several ... can talk much and agreeably, besides knowing well his profession. A good person, cheerful manners, assiduity, kindness and humanity are among the most desirable qualities."

H. A. H.

Public Health

Local-government Reform: an Instalment?

FAR-REACHING changes in the status and functions of local authorities were proposed by the Local Government Boundary Commission in its report for 1947; but the Government did not approve them and dissolved the commission in 1949. In 1954 the five local-authority associations presented their own proposals to the Minister of Housing and Local Government; but the views of the Association of Municipal Corporations differed radically from those of the other four, and the Minister told them that he thought it inadvisable to embark on any extensive reform until there was some broad measure of agreement among the local authorities themselves. He made it clear that he did not think that the existing system of local administration had broken down, and that he would not contemplate eliminating either the two-tier system in the counties or the one-tier system in the big towns. On hearing this, the representatives of the associations made a fresh attempt to reach agreement on the basis of the existing structure, and they have now made proposals in common. These form the appendix to a white-paper[1] in which the Government give their own opinions on what should be done.

At a press conference on July 31, Mr. Duncan Sandys, the Minister, explained that a comprehensive review of local-government finance is being undertaken; but both finance and the functions of local authorities are omitted from the present white-paper, which thus limits itself to five other problems—creation of new county boroughs, extension of existing county boroughs, revision of county areas and of county district areas, and organisation of conurbations.

The present machinery for creating or extending county boroughs (usually by a private Bill) is condemned as unsatisfactory, costly, and often abortive. The Government therefore propose to establish two Local Government Commissions (one for England and one for Wales) whose "main task would be to make recommendations to the Minister in regard to the creation and extension of county boroughs, any necessary alterations in county boundaries, and the organisation of local government in the conurbations." Outside the conurbations, the county councils would remain responsible for reviewing their district areas and proposing changes.

County boroughs.—In judging whether a town should be accorded county-borough status, account should be taken of its population, resources, and administrative record, and the consequences of the change for the county or counties concerned. Outside the conurbations a town with more than 100,000 inhabitants should be assumed to be large enough to be a county borough, but smaller towns would need a strong case. In a conurbation the minimum size of population for a new county borough should be at least 125,000. County boroughs with fewer inhabitants are not necessarily unfit for their status (there are 34 with a population below 100,000); and though the commission should be free to recommend withdrawal of county-borough status, if satisfied that a particular authority is unable to discharge its duties effectively, this serious step should be considered only where it is plainly necessary for efficient administration. Where extension of boundaries is suggested, the onus should lie on the county borough to show that the advantages to its own inhabitants, and those of the area claimed, would outweigh any disadvantages to the county.

Counties.—If a county should become no longer a viable unit of administration, the commission should not be precluded from recommending its amalgamation with another, or even the transfer of substantial territory.

Conurbations.—In the conurbations, autonomous county boroughs are intermingled with districts belonging to counties much of which lie outside the conurbation. These haphazard arrangements are not conducive to efficiency or economy, but there is no simple or wholly unobjectionable solution, and the commission should perhaps be asked to recommend the one which seems best in the particular case.

Greater London has a population of over 8 million, of whom 5½ million live in the two wholly urban counties of London and Middlesex and the rest in 3 county boroughs, and over 35 districts belonging to 4 other counties.

The county of London has a local-government system different from any other; and, as any changes in it would have to be specially considered, the white-paper excludes them from its scope.

Middlesex has eleven boroughs well above the present minimum for promotion to county borough; and "there are really only two practical alternatives"—either to have (as at present) no county boroughs at all, or to have nothing but county boroughs and abolish the county. "In all the circumstances, the Government consider that the two-tier structure should be retained throughout Middlesex and that no promotions to county borough status should be made." But the desirability of some further delegation or transfer of functions within the county should be considered.

County districts.—Here the principal need is to reduce the number of unduly small authorities. (Nearly 500 have fewer than 10,000 people, and over 200 have fewer than 5000.) As soon as each county has had its own area and boundaries settled, it should tackle with determination the task of reviewing the area and boundary of each of its districts.

Non-county boroughs.—Though a county council should be free to recommend changes in any of its districts, every effort should be made to preserve so far as possible the identity and dignities of the boroughs, which by virtue of their charters, history, and tradition are in a special position. No non-county borough should be deprived of its status without the specific consent of the Minister, given after inquiry.

Parishes.—The review of county districts should be followed or accompanied by a reconsideration of parish boundaries.

In the memoranda of 1954, the Association of Municipal Corporations favoured the one-tier system of all-purpose authorities, and wanted it extended as far as possible; but the other four associations contemplated fewer

1. Local Government: Areas and Status of Local Authorities in England and Wales. Cmd. 9831. H.M. Stationery Office. 1956. Pp. 17. 1s.

county boroughs, and a two-tier system in the conurbations. One of the alternatives suggested by the Government for the conurbations is that they should be covered by a group of county boroughs, with certain services administered in common by joint bodies or with directly elected upper-tier authority. This would constitute a two-tier system which would convert the county boroughs into "most-purpose" rather than "all-purpose" authorities. Again, for Middlesex they suggest "some further delegation or transfer of functions" from the county to the boroughs, which might make them into most-purpose authorities. But elsewhere, as the *Times* points out,[2] "there is still nothing between the few-purpose status of boroughs and the all-purpose status of county boroughs": substantial towns which are not county boroughs cannot gain direct responsibility for their main services unless they can achieve that status, and many of them cannot hope to do so. The memorandum of the representatives of local-authority associations said that "certain functions at present exercisable by county councils should be conferred as of right on county districts with a population of more than a figure to be specified" (i.e., on the largest boroughs and districts); but this recommendation has since been weakened by the County Councils Association representatives, who wish to substitute the words "compulsorily delegated" for "conferred"; and the Government have not committed themselves on this potentially important recommendation.

2. *Times*, Aug. 1, 1956, p. 9.

Infectious Diseases in England and Wales

Disease	Week ended July			
	7	14	21	28*
Diphtheria	7	5	2	3
Dysentery	1235	1149	973	843
Encephalitis:				
Infective	7	2	7	5
Postinfectious	3	3	4	4
Food-poisoning	480	396	291	419
Measles, excluding rubella	3429	3276	3286	3270
Meningococcal infection	31	42	34	19
Ophthalmia neonatorum	32	45	24	45
Paratyphoid fever	22	16	16	25
Pneumonia, primary or influenzal	259	210	221	198
Poliomyelitis:				
Paralytic	72	49	70	71
Non-paralytic	42	58	72	89
Puerperal pyrexia	185	220	222	205
Scarlet fever	682	514	531	573
Smallpox	—	—	—	—
Tuberculosis:				
Respiratory	636	609	610	641
Meninges and C.N.S.	6	10	12	9
Other	77	64	89	64
Typhoid fever	7	2	4	4
Whooping-cough	2405	2404	2558	2388

* Not including late returns

Medicine and the Law

Secret Justice

SHOULD proceedings of disciplinary tribunals under the National Health Service take place in secret? Regulation 5 of the Service Committees and Tribunal Regulations provides that, in their investigation of complaints, service committees shall sit in private and only such persons shall be present as are permitted by the regulation. The proceedings of the N.H.S. tribunal are required to be in camera unless the respondent practitioner requests otherwise.

The evidence submitted to the Committee on Administrative Tribunals, sitting under the chairmanship of Sir Oliver Franks, reveals some divergence of opinion as to whether privacy is desirable. The British Medical Association representatives told the committee[1] that the doctor-patient relationship was based on confidence in the doctor and that it would be harmful to that confidence among patients if a case "were written up in headlines" and in the long run the complaint was not substantiated. Asked whether the B.M.A. delegation were satisfied that "the poor patient can get his complaint fairly and impartially judged," Dr. E. A. Gregg said that he was amazed by this suggestion as he had never heard anything of the kind before. The B.M.A. considered that complaints could be more fully examined in the informal atmosphere of service committees; in any event, patients had a right to take a claim for damages to the courts.

Saying that "justice in secret is always a difficult conception, and this is justice in secret," Sir Oliver Franks asked whether the delegation had no doubt that secrecy is right. Dr. Gregg replied: "Undoubtedly, taking it on balance."

A contrary view has been put to the Franks Committee by the chairman of the N.H.S. tribunal, Sir Reginald Sharpe, Q.C.[2] He could see no reason why the tribunal should not sit in public. The regulation against this was "one of the most distressing features of our existence as a tribunal." When it was put to him that the doctors had suggested that unreasonable or frivolous complaints might be damaging if ventilated in public and found to be unsubstantiated, he said that he did not think that this was a sufficient reason for secrecy. Sir Reginald told the committee that the tribunal had had 73 cases in nearly eight years of existence, and in no case had the respondent practitioner asked for the inquiry to be in public.

1. *Times*, July 19, 1956.
2. *Ibid*, July 10, 1956.

N.H.S. and the Press

A private member's Bill[3] has been introduced to give the press the right of admission to meetings of various public bodies, including regional hospital boards, hospital management committees, and local executive councils. The Bill, if it becomes law, would apply also to any committee or subcommittee appointed by any of these bodies, but only to the extent that their decisions do not require the approval of the parent body.

The Bill, as at present drafted, does not apply to boards of governors of teaching hospitals. It would seem that the Bill is not intended to apply to disciplinary proceedings before service committees, since the recommendations of such committees require the approval of the local executive council. The council are, however, to accept as conclusive any finding of fact made by the service committee, and it might be argued that the press would be entitled to attend that part of the proceedings which is concerned with the finding of the facts; this might create difficulties in practice and would be incompatible with regulation 5 of the Service Committees and Tribunal Regulations, noted above.

The right of admission would not be absolute. Each public body affected by the Bill would have power to exclude the press temporarily, if the majority of members present consider it would be in the public interest.

The Bill would also give the press the right to obtain copies of documents circulated to the members of the body concerned, but the secretary or other proper officer would have the right to refuse a copy of any document which in his opinion it would not be in the public interest to disclose. Where copies of documents were supplied, the body concerned might make a reasonable charge.

3. Public Bodies (Admission of the Press to Meetings) Bill.

In England Now

A Running Commentary by Peripatetic Correspondents

OF course memory is bound to play tricks, but I do not think I am too wide of the mark when I say that in the good old days before the second world war, parting with one's appendix was only slightly less pleasant than a luxury cruise and nearly as beneficial. It meant at least a fortnight of blissful inactivity, followed by a substantial period of convalescence in order to "get one's strength up."

How carefully and painlessly the appendix patient was raised to Fowler's position; how tenderly he was sponged; how delicately fed; until at the end of a week (sometimes longer) of what can only be described as "Dresden china" treatment, he would be allowed to dangle his legs over the side of the bed for a few moments as the first stage in his rehabilitation programme. On the following day he would be lifted by two husky nurses into a chair at his bedside where he would sit, swathed in a blanket, while his bed-linen was being changed. After which he would be just as gently lifted back again. The next day would find him (provided he had suffered no relapse in the meantime) taking his first tottering post-operative step from bed to chair, watched over by an anxious nurse who would be standing at the ready lest, in his weakened condition, he should fall. And thus by easy stages he would reach the day when, accompanied by the ward sister, the porter, two probationers, a loving wife, and lots of exhortations to look after himself and not overdo things, he would make his triumphant departure from the hospital.

But ever since some bright member of the medical profession discovered that fatal embolism was due to postoperative immobility, hospitals have been amongst the strongest adherents of the "Do It Yourself" craze.

"Well, you can begin to get up today," the day-nurse greets you, less than 24 hours after your glorious, if unconscious, hour in the operating-theatre. "You'll feel better then," she adds, giving you a thank-heaven-that's-one-less-bedpan look. Actually you are feeling reasonably comfortable where you are at the time, but you try to look as though you have spent the night longing for her permission to get out of bed and ask politely the way to the bathroom (which is almost bound to be at the extreme end of the corridor). You lie and contemplate the journey for as long as you dare, thrusting courageously to the back of your mind an overwhelming desire to shout for a bedpan. It's an effort, but just because you happen to be a doctor's wife and an ex-nurse you can't expect preferential treatment. You struggle to a sitting position and eventually manage to swivel round until your legs are over the edge of the bed and you sit there recovering your breath. Slithering to the floor, you carefully straighten yourself as far as you can without snapping in two. Then having shuffled into your slippers and pulled your dressing-gown round your shoulders, you begin your perilous journey down the corridor, looking for all the world like the oldest inhabitant. You glare balefully through the door of the next room at the occupant who is enjoying her second week of idleness on the strength of nothing more serious than an ingrowing toenail, when you realise that your innards have come completely adrift and are going to part company with you at any moment. Frantically clutching your abdomen you stagger ahead to prevent the awful catastrophe happening in a public corridor. Having reached the bathroom, however, you find that your innards, and indeed all-that-in-them-is, are completely undislodgeable—a discovery which comes as a keen disappointment, for by this time you have made up your mind that life would be more pleasant without them. Back at last. How inviting that bed looks. It's a long way up, but never say die. Now that really *has* torn it. You've flopped back too suddenly on your pillows and bust all your inside sutures. Internal hæmorrhage will surely ensue. You sink back exhausted, wondering weakly if anyone will notice you before you have bled to death.

"The pain," you gasp feebly a little later when the doctor does his round. "What's the matter?" he asks jovially. "Wind? You want to move around you know. Why not try walking to the bathroom?" "Wind?" asks Matron sympathetically. "Wind," nods Sister knowingly. "Wind," echo the nurses. "You should get up and walk about a bit more."

Fortunately everything passes sooner or later, even wind, but the fact remains you are now an up-patient, and if by tomorrow you are not helping to make your own bed and those of your less ambulatory neighbours you can consider yourself a malingerer. Almost before you have time to write and tell your friends you have had an operation and to sit back and wait for the grapes to arrive, you find yourself back home, going about your daily round and common task secure in the knowedge (if it is any comfort to you) that if there is any clot around it won't be in your blood-stream.

* * *

Surely it does not become us as a profession to smile at the suffering owner of a "gastric stomach" (Aug. 4, p. 251); we are more guilty of tautology than most people. My college tutor opened my eyes to this when, reading a weekly essay, he roundly condemned the absurdity of "high altitudes," a phrase which had hitherto seemed to me (and apparently many distinguished physiologists) unexceptionable. But it is in the speech and writing of clinicians that this form of semantic nihilism abounds. In the course of a single day last week I heard a general practitioner request an abdominal belt for one of his patients, a neurologist advise a cervical collar for a case of spondylosis, and a house-physician discover a pleural friction rub (a physical sign widely recognised, I believe, at our local teaching hospital). It was a relief to read that the R.S.O. had visited this last patient and had recorded: "Visible peristalsis not seen."

* * *

When I told Punicus that I get a pain in the back not only from gardening, but also from thinking about gardening, I am sorry to say that his reply was "Horto-suggestion, old man."

* * *

Not only do I have the best nursing-home in England as a place of retreat in times of crisis, but also I belong to the most generous provident association. After I had had my last three teeth extracted in the nursing-home, the question arose as to who was going to pay for this luxury. I wrote to the provident and told them that I had had three teeth removed in a nursing-home because I was too old to drive 17 miles to the nearest dentist and go through the whole process of studying an ancient *Punch* in his waiting-room, having three teeth out in his chair, and finally hastening to the nearest hotel for brandy. What about it? They replied that for teeth in a nursing-home they paid only if the teeth fulfilled certain conditions. They would pay if the teeth came under the heading of (*a*) alveolectomies, which, if it means anything at all, is cutting out the socket in which the tooth is set, (*b*) apicectomies, which means cutting off the top of the tooth; or (*c*) extraction of teeth (multiple). Surely (*c*) brought my teeth into the picture. I wrote to the provident and told them that I had three teeth extracted and that according to Stephens's *Commentaries on the Laws of England* three or more are multiple. A policeman can disperse three disorderly people in the street because in law they constitute a crowd or multitude, but he cannot disperse two. The provident replied that I had raised an interesting point, and that they had written to the Ministry of Health to inquire their definition of multiple. The Ministry replied that multiple tooth extraction means not less than ten teeth extracted at the same time. I had always known that Ministries are very powerful, but I had not realised that they could override the laws of England. The provident evidently thought the same, for they were very helpful about paying for the teeth.

* * *

News from America. "I am in Central Supply where, amongst other labour-saving gadgets, they have an electric thermometer-shaker. If the nurses get a thermometer that hasn't been shaken they won't use it."

Letters to the Editor

INFECTION OF THE NEWBORN

SIR,—Papers describing serious epidemics in maternity units are becoming a common feature of medical journals, and your recent issues again stress the dangers of streptococcal and staphylococcal infections in the newborn.

Dr. Allan Gray (July 21) reports that 18 out of the 22 neonates involved showed streptococcal infection of the umbilicus. I am not sure of the meaning of his statement that "thus the modern custom of leaving the umbilical stump uncovered demonstrates the widespread dissemination of the organism in the nursery." Does he, in fact, condemn this practice and feel as I do [1] that sufficient evidence is accumulating [2] to warrant a return to the traditional sterile dressing till healing is complete? In the epidemic described the midwife from whom type 8/25 streptococcus was first isolated had had a finger infection a couple of months before, following a prick with a napkin-pin. Here in Oxford the midwives have an ingenious method (at which I am singularly inept) of tucking the napkin securely round the neonate without the use of a safety-pin, thus eliminating one possible source of trauma: this might well become a general practice.

Dr. Beaven and Dr. Burry (Aug. 4) describe an epidemic of staphylococcal pneumonia and divide the clinical course into three parts where "nasal infection only" is the first. They consider that the pneumonia (stage 3) follows stage 2 ("infection of the upper respiratory tract with cough") and apparently results from inhalation. It seems possible that arrest of the condition at stage 1 might be helped by posture; infants with nasal obstruction or discharge should be nursed well over on the side, with the foot of the cot raised to promote draining and diminish the risk of inhalation.

We all dread the type of epidemic described in these two interesting papers, and know that they can develop in spite of the greatest care and attention to detail. We must thank Christchurch for re-emphasising the importance of keeping at least one antibiotic in reserve for specified cases and once more urging us to treat all these drugs with the greatest respect.

The Radcliffe Infirmary, Oxford. VICTORIA SMALLPEICE.

PROLONGED CHEMOTHERAPY IN CHRONIC PULMONARY TUBERCULOSIS

SIR,—Dr. Tinne's interesting results, described in his letter last week, are in full agreement with some which we have obtained in our laboratory and hope to publish shortly. In reply to his question my personal opinion would be that routine sensitivity tests with derivatives of isoniazid and P.A.S. are not justified in addition to those with the parent drugs. But, in a field in which we know so little, it would be unwise to go any further than that. Our present drug-sensitivity tests in tuberculosis fall short in many ways and are not devised to tell us about effective combinations of drugs. There is a great need for improved methods of determining drug sensitivity of tubercle bacilli and especially of detecting "synergistic" combinations of drugs or their derivatives. We are hoping that the semi-solid agar media which we are using [3 4] may prove to be of value in these problems.

Department of Bacteriology, Guy's Hospital Medical School, London, S.E.1. ROBERT KNOX.

SIR,—With great interest I read the article by Dr. Joiner and his colleagues in your issue of July 28 about isoniazid and P.A.S. in chronic pulmonary tuberculosis. But some doubt was raised whether the groups R and IP were in all respects comparable.

Before treatment, the bacilli of all patients in group R were sensitive to isoniazid, streptomycin, and P.A.S., and those of all patients in group IP were sensitive to isoniazid and P.A.S. (the sensitivity to streptomycin was not tested). But table VII shows that, of the 9 "failures" in group IP, 6 harboured streptomycin-resistant bacilli. These 6 patients did not get streptomycin during the trial; therefore their bacilli must have been streptomycin-resistant before it began. Thus, group IP contained from the beginning at least 6 patients with streptomycin-resistant bacilli, and group R 0—a fact which may have influenced the results.

Another circumstance that may weaken the conclusions is that all patients were outpatients. Was the environment at home and the degree of rest taken there quite comparable in both groups?

We feel that the use of the three antibiotics together, either simultaneously or in rotation, has the drawback that it might provoke resistance to the most reliable of them. An earlier article by Dr. Joiner and his colleagues [5] contains some figures (table v) which are not very reassuring. We learn therefrom that, of the same 15 patients of group R, 3 harboured streptomycin-resistant bacilli after twenty-four weeks of treatment or less, and only 3 others showed no resistance at all.

As a rule we like to reserve streptomycin for temporary daily use in the case of resections or other surgical measures; and we avoid the routine use of streptomycin as much as possible.

Streptomycin resistance is permanent (in contrast to P.A.S. resistance), and is an extra danger for the patient himself (e.g., greater operation risk), as well as to those around him.

Dutch Students' Sanatorium, Laren, Holland. F. N. SICKENGA.

IDIOPATHIC HYPERCALCÆMIA OF INFANCY

SIR,—We are grateful to Dr. Mitchell, Dr. Stowers, and Dr. Thomson for their comments (July 14) on our paper (June 23). In view of the variety of ill-understood factors which may influence the metabolic effects of vitamin D, a substance about whose biochemistry and fate in the body so little is known, it would probably be unwise to attach undue significance to any one finding relative to calcium, phosphorus, or citrate metabolism. It would be equally unwise to allow an over-zealous attempt to force all our findings into the ætiological hypothesis of vitamin-D overdosage or hypersensitivity to obscure a fully objective appraisal of them.

If two infants, who are suggested to be suffering from a condition of vitamin-D intoxication, receive vitamin D in a dosage of 50,000 to 100,000 units daily for a week (i.e., in a week about five times the total amount of vitamin D which was supposed to have caused their illness); if neither shows any accentuation of the symptoms of anorexia, vomiting, hypotonia, and constipation from which characteristically they have been suffering; if one shows no loss in weight while the other shows slight loss in weight (in a condition in which intermittent loss of weight is common); surely such evidence is strongly against the concept of vitamin-D overdosage or hypersensitivity.

In any consideration of idiopathic hypercalcæmia of infancy the age of the patient, as Dr. Hubble (July 21) has also pointed out, is of primary importance. Many relevant metabolic processes, such as calcium and cholesterol metabolism, differ at this age-period from such processes in the adult, and it is unwise to argue from adult experience. Our study of the literature shows that at the idiopathic hypercalcæmia age-period the longest duration of symptoms after withdrawal of vitamin D in even the grossest cases of hypervitaminosis D is about two months. In idiopathic hypercalcæmia the duration of symptoms after withdrawal of vitamin D may be considerably longer than that. Adult cases, such

1. Smallpeice, V. *Brit. med. J.* July 14, 1956, p. 104.
2. Murray, A. B. *Ibid*, 1956, i, 1530.
3. Knox, R. *Lancet*, 1955, ii, 110.
4. Knox, R., Swait, E., Woodroffe, R. *J. gen. Microbiol.* 1956 (in the press).
5. Joiner, C. L., MacLean, K. S., Carroll, J. D., Marsh, K., Collard, P., Knox, R. *Lancet*, 1954, ii, 663.

as that referred to by Dr. Mitchell and his colleagues —an elderly woman with rheumatoid arthritis who had been taking a gross overdosage of vitamin D for 3½ years —are largely irrelevant to the issue of idiopathic hypercalcæmia of infancy.

Dr. Colver and Professor Illingworth in their letter of July 14 draw attention to another aspect of idiopathic hypercalcæmia which appears to argue against vitamin-D ingestion as the primary cause—namely, the marked difference in incidence which seems to exist in different parts of the country. Such differences would be more readily understood on the basis of an infective ætiology.

It is accepted that vitamin D is a physiological necessity for normal bone growth in infancy. There is good evidence, too, that idiopathic hypercalcæmia can occur in infants who are receiving no more than the physiological requirement of vitamin D and in whom therefore overdosage is not a factor. In such cases "hypersensitivity" has been postulated. It would be an unusual pathological paradox that a substance physiologically necessary and given in physiological amount should also be responsible for producing disease. To argue in terms of hypersensitivity in such cases is surely to argue that something other than ingested vitamin D is the primary ætiological factor.

J. O. FORFAR
Western General Hospital, Edinburgh. S. L. TOMPSETT.

THE DEFINITION OF PSYCHOSOMATIC DISORDER

SIR,—It is not often that you take notice of non-medical publications, and I enjoyed your light-hearted editorial of Aug. 4 on my article.

The most amusing part was your solemn thanks to me for reminding the profession of the need for "a true metaphysical background" to medical practice. My point was, of course, the irrelevance of metaphysics to the question of what a psychosomatic disorder is. But the correspondence column of a medical journal is hardly the place for serious controversy on a subject of this sort, and presumably any of your readers who *are* seriously interested will look up the journal itself, where they will find some genuine arguments against my definition, by an intelligent physician from the U.S.A.

Edinburgh. NIGEL WALKER.

P.S.—It occurs to me that you may have confused metaphysics with theology: but both are irrelevant.

MALIGNANT PUSTULE IN THE ILEUM

SIR,—The recent interest in ileitis may perhaps justify inclusion of the following fragment in the literature on diseases of the ileum.

Between midnight and daybreak in the middle of the hot weather of 1905, a private of the 3rd Hussars was admitted in a moribund state to the station hospital at Sialkot, Punjab, India. No medical officer saw him alive, and later the same morning I was asked to do a necropsy to discover the cause of death. There was no external lesion and the first unusual feature noted was that the blood had not coagulated. I found no lesion in any organ, including the central nervous system, other than a prominent ulcer about 1 in. across, conical with the apex of the cone a few millimetres above the surrounding mucosa, and situated 9–12 in. above the ileocæcal valve, on the surface opposite to the mesenteric attachment of the gut. There was no surrounding inflammation and, never having seen such a lesion in the bowel, I did not know what to make of it. I took smears for microscopical examination from the ulcer, the liquid blood, the spleen, and the brain. Then, leisurely, having the necessary kit in my bungalow, I stained a number of the smears by the old Romanowsky method, which takes an hour, hoping that I might get some specimens of malignant malaria—a bad guess! The sight of the first microscopic field provoked rather intense activity on my part. I hastily examined all the slides and in each saw multitudes of bacilli morphologically indistinguishable from anthrax.

With the colleague who had assisted at the necropsy, I re-opened the body, fished out the spleen and, having well seared its surface, made stab cultures from its substance into gelatin. Next day I was going on leave to Cashmere, but I took the culture tubes with me to leave in the command sanitary officer's laboratory in Murree. By the time I arrived in Murree the growth in gelatin had the "fir-tree" appearance typical of anthrax.

Incidentally, the necropsy was done without gloves (such things were not to be had at that time), and my hands like those of my colleague were covered with scratches due to irritation of sandfly bites. The vigorous disinfection of our hands about four hours after the necropsy may perhaps have prevented a further anthrax infection but I did view a carbuncle which developed on my left wrist a few days later with some despondency, no anti-anthrax serum being available.

In the light of after-wit, I recognised the lesion in the ileum as a malignant pustule and the question arose as to the origin of the infection. It appeared that the deceased had been a military policeman who, some days previously, had seen some natives crossing his barrack square leading a pony carrying a load of hides. He had hurried them off and in the haste the load had fallen off the pony. In his anxiety to get these natives off the forbidden territory, he had helped to put the hides back on to the pony's back. Then he must have fed without washing.

Why was the only lesion so far along the intestinal canal? I have thought it must have been because the traffic block at the approach to the ileocæcal valve gave the bacilli their first opportunity to gain a foothold; or perhaps the stagnation there caused some slight breach in the mucosa. Why was neither of us infected, though the contamination of my hands during the necropsy was clearly responsible for the carbuncle on my left wrist? Rightly or wrongly I always regard the scar of that carbuncle as a reminder that possibly my microscope, by revealing the cause of death, saved us from infection.

London, S.W.1. L. W. HARRISON.

PRIMARY ATYPICAL PNEUMONIA

SIR,—I regret that your leading article of July 28 once again emphasises a virus ætiology of primary atypical pneumonia.

Scores of cases of primary atypical pneumonia are seen in the Royal Air Force every year and we know, from careful history-taking, serial radiography, and serial bronchography, that, in the great majority of cases, the mechanism is one of an aspiration pneumonia, and we prefer to call the condition by this name as suggested by Robertson and Morle.[1] This does not deny the existence of "virus" pneumonia, but we do not see this condition and we believe it to be a rare form of pneumonia.

The aspiration of iodised oil in normal subjects was demonstrated by Brock et al.,[2] and it is very likely that the aspiration of infected material during upper-respiratory infections is common. Brock[3] elaborated this theory of "bronchial embolism" in the ætiology of lung abscess, which is surely no more than an intense aspiration pneumonia. This condition is, however, relatively rare and in the majority of cases aspiration of infected material from the upper respiratory tract, we believe, gives rise to a benign aspiration pneumonia. The course of an aspiration pneumonia probably depends upon the type and virulence of any bacteria that may have been carried down with the aspirated material. The majority do not progress beyond collapse and consolidation; but progressive consolidation, empyema, or lung abscesses may occur in a minority of cases.

1. Robertson, P. W., Morle, K. D. F. *Brit. med. J.* 1951, ii, 994.
2. Brock, R. C., Hodgkiss, F., Jones, M. O. *Guy's Hosp. Rep.* 1942, 91, 131.
3. Brock, R. C. Anatomy of the Bronchial Tree. London, 1946.

The majority of aspiration pneumonias are, then, benign conditions, and, from personal observations, are probably as common amongst the civilian population as amongst Service personnel. It seems a great pity therefore that many hundreds of people will, during the next winter, receive large doses of wide-spectrum antibiotics for so-called virus pneumonias, much to the detriment of their gastro-intestinal tracts, when all they need is a period of rest in bed plus postural drainage, breathing exercises, and percussion.

Robertson and Morle [4] observed that bronchial damage can occur, and is in fact common, in benign aspiration pneumonia, and that the condition is reversible when treated by physiotherapy as outlined above. One wonders if those who attempt to eradicate a "virus pneumonia" by treating benign aspiration pneumonia with antibiotics alone are laying the foundations of a future bronchiectasis.

Chest Unit,
Royal Air Force Hospital,
West Kirby, Wirral, Cheshire. JOHN GILROY.

A MODIFIED PINARD'S FŒTAL STETHOSCOPE

SIR,—The usual metal type of Pinard's fœtal stethoscope is unpleasantly cold for the patient, especially in winter. These stethoscopes are even colder when kept standing on glass, tiled, or metal-topped trolleys in the outpatient department, antenatal clinic, delivery rooms, or elsewhere.

Remembering having used a rubber-ring cushion on the metal bell-end of a standard binaural stethoscope, I decided to apply the same principle to the fœtal stethoscope. Though there is on the market a vulcanised Pinard's fœtal stethoscope with rubber ends, I believe that the type now made for me by Down Bros. and Mayer & Phelps Ltd., is preferable, both because it is more durable and for other reasons.

A removable latex rubber cushion is attached to the base of a standard-pattern aluminium Pinard's fœtal stethoscope. Thus modified, the instrument is not only more comfortable for the patient—being neither cold nor hard—but fits more closely to the abdominal wall, and thus makes it easier for the unpractised student and pupil midwife to hear the fœtal heart sounds. It has been in routine use in the antenatal clinic of Queen Charlotte's Hospital for some months.

Queen Charlotte's Maternity Hospital,
Goldhawk Road, London, W.6. M. R. FELL
Resident Obstetrician.

THE CASUALTY DEPARTMENT

SIR,—In your issue of July 28 Mr. Gissane makes an eloquent plea for the seriously injured patients seen in casualty departments.

It is in the so-called "trivial injuries," however, that slip-ups occur. I have seen cases referred from the best teaching hospitals where reduced finger dislocations have been immobilised in a straight splint for a week. Similarly, a "chip" fracture of one of the phalanges of the finger, of no practical significance apart from X-ray appearances, has been immobilised in a rigid straight splint for a week in a man aged 50, resulting in permanent stiffness of the finger joints for which the most intensive physiotherapy proves useless. This usually involves amputation of a digit which gets in the way—a most tragic and reprehensible state of affairs which should never arise.

Until recently, there has been difficulty in staffing casualty departments owing to the fear of being involved in litigation. Thus, many such departments employ relatively inexperienced staff—e.g., those working for a membership or a diploma in obstetrics and gynæcology, many of whom have no real interest in casualty work. Doctors reading for the final fellowship are not keen on casualty appointments, because the work entailed is seemingly too trivial: they prefer appointments where major surgery is done.

The remedy might be to have inexperienced casualty officers working for at least 3 months under the constant supervision of an experienced officer, or to give them an intensive course of postgraduate instruction in the pitfalls of traumatic surgery—with emphasis on finger injuries and X-ray interpretation.

Leeds. I. ROSE.

THERMOMETERS FOR HYPOTHERMIA

SIR,—The increasing use of hypothermia has created a need for an accurate and reliable means of measuring intra-œsophageal and rectal temperatures. The requirements of an instrument for this purpose are:

1. Accuracy at least equivalent to that of a good mercury thermometer.
2. A temperature-measuring element (of a size suitable for either adults or children) which is easy to pass and cannot cause trauma.
3. A large easily read temperature scale with a range from 20° to 40°C, preferably giving a direct reading—i.e., not requiring constant zeroing of subsidiary controls.
4. Robustness—i.e., ability to stand up to normal hospital usage.
5. Simplicity in use, requiring no re-calibration beforehand, and capable of sustained accuracy for months or years without any form of maintenance or adjustment.

Investigation of the instruments on the market showed that none came up to all these ideals, and experiments were therefore undertaken on our behalf by the instrument department of the London Hospital. As temperature-measuring elements, copper-constantin thermocouples were first tried, but these were abandoned because of the frequent necessity for recalibration and because of their unsuitable shape, and thermistors were used instead. These, being small, can be mounted in a soft flexible plastic tube of 19 Charrière size, with a smooth rounded end as the temperature-measuring element.

Using this element in a Wheatstone-bridge circuit did not give the requisite accuracy over the whole temperature scale required; so we finally adopted a circuit working on the principle of measuring the difference between a known predetermined electric current

4. Robertson, P. W., Morle, K. D. F. *Brit. med. J.* 1953, i, 130.

and the varying current passed by the thermistor. By this means temperatures between 20°C and 40°C can be read on a four-inch scale discriminating to 0·1°. No presetting or adjustment is required: all that is necessary to bring the instrument into use is to plug in the element.

The original model has been in regular use at the hospital since last October, and has maintained its accuracy without any adjustment or repairs of any kind. In the past two months further refinements for temperature recording have been added. Thermistors have been mounted in a 17 s.w.g. needle, similar to a hypodermic needle, to obtain intramuscular temperature reading, and also in applicators for measuring the temperature of the skin.

Our thanks are expressed to Mr. N. W. W. Ellis, of the electroencephalographic department, the London Hospital, for his work on thermistors, and also to Mr. T. J. Burns, of Matburn Ltd., 25, Red Lion Street, London, W.C.1, from whom the instrument may be obtained.

The London Hospital, London, E.1. S. D. K. STRIDE
R. W. DAVIS.

THE IRON LUNG FROM THE INSIDE

SIR,—May I add some further personal experiences to Dr. Ashwin's excellent article (July 28)? I am sure he has rendered a great service to patients with poliomyelitis who are unfortunate enough to be in an iron lung.

Firstly I would like to reiterate his plea for care in regard to the acutely sensitive skin of the patient, and how difficult it is to deal with this discomfort. Symptoms I found particularly trying were itching and irritation due to small rucks in the sheets which, if not dealt with, rapidly become intolerable.

Secondly, the higher centres are always in a great state of activity so that the patient may be severely apprehensive. A few moments spent every day explaining the whys and the wherefores can be extremely comforting.

I would like to appeal to all doctors and nurses that, when talking to a patient, they stand where it is easiest for the patient to see their faces. Nothing is more tiring than straining one's eyes and neck in order to see the speaker's face.

London, N.W.7. M. V. SMITH.

PSYCHOTHERAPY IN ULCERATIVE COLITIS

SIR,—Dr. Paulley's article last week is interesting and instructive. His contention that many cases of ulcerative colitis show a personality related to failure to express certain emotions such as anger, and display a sense of dependency and sensitivity, is in keeping with the findings of others,[1–6] who emphasised frustrated aggression and a sense of inferiority and humiliation in this psychosomatic entity.

Raginsky [7] sounded a note of warning, for, in some cases where the symptoms were "cured" by psychotherapy, the patient later developed a psychotic reaction which in turn disappeared when the bowel symptoms returned.

Time might have been saved in cases 1, 3, 5, and 6 by using a hypnotherapeutic approach. When these patients are subjected to light hypnosis much tension is released and their emotional problems are more readily revealed. Patients displaying this personality are easily hypnotised. Cases have been described [8] resistant to psychotherapy but relieved fairly rapidly following hypno-analysis. There is less risk of relapse and thus avoidance of subsequent surgery.

London, W.1. GORDON AMBROSE.

1. Frankel, F. *Brit. med. J.* 1949, i, 1403.
2. Groen, J. *Psychosom. Med.* 1947, **9**, 151.
3. Alvarez, W. C. Nervousness, Indigestion and Pain. New York, 1943.
4. White, B. V., Cobb, S., Jones, C. M. *Psychosom. Med. Monogr. suppl.* 1939, **1**, 1.
5. Lindemann, E. *Arch. Neurol. Psychiat.* 1945, **53**, 322.
6. Portis, S. A. *J. Amer. med. Ass.* 1949, **139**, 208.
7. Raginsky, B. B. Hypnosis in Modern Medicine. Illinois, 1953; p. 39.
8. Ambrose, G., Newbold, G. Handbook of Medical Hypnosis. London, 1956; p. 59.

PLEUROPERICARDITIS

SIR,—On considering your leading article of July 14 and on reading Dressler's work, I feel that a proportion of the cases that he describes may be bacterial in origin.

If this is so they may resemble some cases of pericarditis seen in a series of 33 patients with staphylococcal septicæmia treated in Leeds in the past two years. 8 of these patients had pericarditis; 4 of these had associated pleural effusion, and 1, who came to necropsy, had in addition a small myocardial infarction and an interstitial inflammation of one cusp of the mitral valve. These lesions arise as a result of bacterial emboli which have spread through the coronary tree and the pericardial vessels. Exact bacteriological diagnosis depends on the blood-culture in the early days of the illness before the commencement of treatment. If this opportunity is missed a long and relapsing type of illness ensues in which diagnosis may be impossible. In my experience relapse is the rule in the absence of prolonged effective therapy which requires the use of combinations of antibiotics.

It seems to me also that the postcommissurotomy syndrome may be bacterial in origin. Papp and Zion [1] isolated the *Staphylococcus aureus* from a pocket of inflammatory tissue in the pericardium of a patient who was undergoing a second thoracotomy. If this is the explanation for the syndrome, it may be that this low-grade self-limiting type of staphylococcal infection may be facilitated by the preoperative use of a single wide-spectrum antibiotic to which the organism is resistant.

Department of Infectious Diseases, Seacroft Hospital, Leeds. E. F. MURPHY.

THE SUSCEPTIBLE STATE IN POLIOMYELITIS

SIR,—I read with interest the paper by Dr. Dane and his colleagues [2] on the antibody levels to poliovirus in Northern Ireland children. These studies confirm the now generally held view that poliovirus infections compare in their frequency with measles. It is also generally held that the 0–4 age-group is the least susceptible to poliomyelitis of the nervous system and that crowded primitive communities, by affording virus ubiquity to the infant, ensure early infection and thus forestall adult epidemics. However, a "severe localized outbreak of infantile paralysis" has now been described from the Tropics [3] under those very conditions. It is clear, then, that serological studies alone cannot explain why some infants in their first infection acquire poliomyelitis of the nervous system, nor why some communities year after year acquire immune bodies by silent infections while others are afflicted at recurring intervals with distressing outbreaks of the paralytic disease. The easiest explanations have been accepted—namely, that by a process of mutation the virus has acquired new properties of penetration, or that a pre-existing virus acquires an enhanced virulence for reasons unknown. These explanations still do not explain why such "new" viruses are still silent in the great majority so that the problem is merely pushed a little further out of sight. Nor do they offer a reason for the localisation of the disease at different cord levels in spinal disease or the existence of two well-defined clinical types in the spinal and bulbar varieties. The susceptible state of the individual at the time of infection must therefore be considered, and it affords a quite simple and comprehensive explanation as to why virus is able in some individuals to cross the blood-brain barrier and enter the central nervous system.

1. Papp, C., Zion, M. M. *Brit. Heart J.* 1956, **18**, 153.
2. Dane, D. M. S., Dick, G. W. A., Connolly, J. H., Briggs, E. M., McLeod, W. J. *Lancet*, 1956, i, 481.
3. Kerr, W. G., Pease, N. J. *Brit. med. J.* 1956, i, 1337.

Neural as opposed to non-neural poliomyelitis is known to be associated with several procedures or states which are quite transitory, so that susceptibility in the nervous system must clearly be a variable. The intense predilection of the virus for those cells which innervate striped muscle makes it appear likely that this variable is associated in some way with functional state of that muscle. Striped muscle exists in two forms—namely, the voluntary striped muscle which moves the skeleton and controls facial expression, and the specialised involuntary striped muscle of the pharynx and upper œsophagus which performs the second or involuntary stage of deglutition. Spinal-type disease occurs when the motor neurones of the first group are affected, and bulbar-type disease when the motor neurones of the pharynx are involved (namely the ninth, eleventh, and all-important tenth cranial nerves). All the known clinical associations of neural poliomyelitis have in common a prolonged heightening of striped-muscle tone in response to new conditions arising in or about them, or prolonged physical activity [4] as a fundamental predisposing factor. The response to intramuscular inoculations, especially those designed for a prolonged residence at the site of injection such as the heavy metals or immunising toxoids, manifests itself as a segmental poliomyelitis affecting the inoculated limb. The response to the progressive enlargement of the uterus during pregnancy shows itself as an increased incidence only of the spinal variety, also segmental, and affecting the anterior and lateral abdominal muscles supporting the uterus and the muscles of the thigh. When physical exercise has been prominent in the onset of the disease it is the lumbar or cervical enlargements of the cord distributing the neurones of locomotion or manual exertion which are most affected. It would appear then that an essential biological requirement of virus for a successful penetration of the axon is that the axon shall be in a state of prolonged and sustained activity either direct or mediated reflexly as opposed to the phased activity of the muscle-groups and their respondent neurones in the maintenance of normal tone or during normal activity.

Turning now to bulbar poliomyelitis it will be readily realised that, because of their unique function in the process of deglutition, the pharyngeal muscles are much more responsive to excitation than voluntary striped muscle, so that there at once appears a physiological and regional reason for the existence of the two types of poliomyelitis. The response to tonsillectomy and adenoidectomy during a first poliomyelitis infection is that of a most severe bulbar-type disease affecting the neurones of the pharyngeal muscles. When therefore bulbar or bulbospinal poliomyelitis of an *epidemic* character breaks out it is certain that the determining influence is the associated infective pharyngitis and that among the families of hæmolytic streptococci, staphylococci, and perhaps corynebacteriæ will be found the pilot agents of epidemic bulbar and bulbospinal poliomyelitis *in proportion as they specifically affect the delicate pharyngeal mechanism.* It has been my experience that a severe form of pharyngitis is common in farming communities and is spread by milk and milk products and may be related to dairy cattle.[5] I believe this disease, comparatively mild and self-limiting, to be the environmental influence in the heightened incidence of rural poliomyelitis, especially in the prairies of Canada, and that one or more such agents by the speed of modern travel are now becoming established in Tropical as well as Western communities. It may also be the case that a former tonsillectomy may adversely affect local resistance to infective pharyngitis thus explaining the increased incidence of bulbar type disease in remote tonsillectomy. Those interested in this aspect of the disease should read the account by Fox and Chamberlain [6] of four children of one family who died from bulbar poliomyelitis, and then the report by Waddell and Purcell [7] of poliomyelitis in Charlottesville, U.S.A., where an intense localised pharyngitis with 100% mortality in a single home may be contrasted with a widespread pharyngitis causing many cases with less than 1% mortality and only 20% residual paralyses.

The age-group, mortality, and so on will thus be seen to be determined by the immune status not only to poliovirus but to the particular pattern of pharyngitis in the community when a concomitant poliovirus infection is proceeding. Newcomers from foreign parts may clearly introduce new strains or themselves become victims of unfamiliar endemic ones, as may well have been the case in the Malta epidemic (1942) which affected the 2–5-year age-groups among the Maltese and 61 British and only 4 Maltese adults.

Because of the important part played by the cell in replicating the virus from the original viral particle, it is possible that, as in plant virology, the cell may exhibit virus indifference at one physiological state and promote virus growth at another. From the clinical associations of poliomyelitis of the central nervous system already cited it seems probable that such is the case in this disease and that it is the effect of the cell (the nerve-cell and its axonal prolongation comprising the anterior or motor neurone) upon the virus which is the arbiter of the disease process.

In a disease in which so many widely differing procedures or states are known to affect susceptibility, it is in my opinion a mistake to attribute to virus mutation the many seeming anomalies apparent in this condition. Thus I believe that the ultimate story of poliomyelitis of the nervous system will be written around the functional state of the anterior neurone presenting either a barrier or a pathway by means of which, during the viræmic phase of the infection, virus may be denied or gain access to the grey matter proper. Natural, and perhaps artificial, immunity will clearly protect any neurone in the susceptible state. But the pilot agents of susceptibility, often trifling and unnoticed in themselves, must be sought with the same dynamic approach which has been applied to the virus before a full knowledge of this disease and its prevention can be attained.

Rockingham, Nova Scotia, Canada. E. H. EVANS.

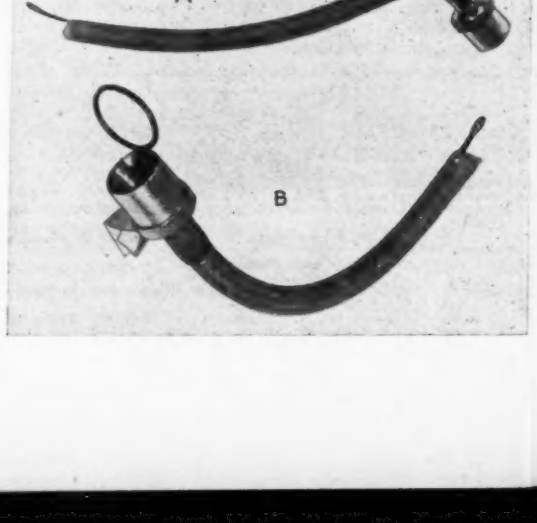
4. Russell, W. R. *In* Papers and Discussions presented at the first International Poliomyelitis Conference. Philadelphia, 1949; p. 104.
5. Evans, E. H. *N.S. med. Bull.* 1954, **33**, 436.
6. Fox, M. J., Chamberlain, J. *J. Amer. med. Ass.* 1953, **151**, 1099.
7. Waddell, W. W. jun., Purcell, C. W. *Amer. J. publ. Hlth*, 1936, **26**, 164.

OROTRACHEAL CONNECTIONS WITH MINIMAL RESISTANCE

SIR,—The orotracheal connections I have already described [1 2] were originally designed in 1951. Since then armoured latex endotracheal tubes have been introduced. These require a stilette for introduction into the trachea. For use with these tubes the patterns shown in the accompanying figure have been made.

Pattern A has a hole to allow the passage of a stilette (or suction catheter) and is otherwise sealed with 'Sellotape.' This connection can also be used for "finger respiration." Pattern B is virtually a "sawn-off" version of A, but is being made in light-weight alloy, which has some advantages, and it can be made in any size from 00 to 12. This pattern can also be used as an endotracheal adapter mount.

1. Bullough, J. *Lancet*, 1955, i, 236.
2. Bullough, J. *Anæsthesia*, 1955, **10**, 183.



The resistance in A has already been given[2]: it is from 1/4 to 3/8 of that in various standard apparatus. The resistance in B is slightly less.

It can be shown that the resistance to breathing through these sets is very often less than physiological—i.e., than breathing through the nostrils.

The apparatus is made by Messrs. Chas. King Ltd.

Chislehurst, Kent. JOHN BULLOUGH.

ERYTHEMA NODOSUM AS A MANIFESTATION OF SARCOIDOSIS

SIR,—Dr. James and his colleagues, in their article last week, do not carry the literature further back than 1942. The first reference to erythema nodosum as part of the syndrome of "uveo-parotitis" was made in 1910, and when that syndrome was surveyed by Dr. J. G. Thomson and myself[1] eight examples of erythema nodosum had occurred in forty-seven patients showing the syndrome. Dr. Thomson and I subsequently published another example,[2] together with photomicrographs of biopsy material. This was some years before the term sarcoidosis had been coined.

Leeds. HUGH GARLAND.

CALORIE INTAKE IN RELATION TO BODY-WEIGHT CHANGES IN THE OBESE

SIR,—I have read with interest the article of July 28 by Professor Kekwick and Mr. Pawan. With trepidation I venture to suggest that to a general practitioner the finding that the loss in weight is greater when the fat intake is disproportionately high is not surprising. Such a diet would probably result in a condition of "acidosis" or "ketosis." This is borne out by the statement that the behaviour of the patients under observation was difficult and the diet was so trying that sometimes they could not eat their meals.

Petworth, Sussex. W. ANTONY BALL.

Obituary

ROBERT JOHN McCONNELL
M.Ch. Belf.

Mr. McConnell, whose death has been announced, was consulting surgeon at the Royal Victoria Hospital, Belfast. He was a student as well as a surgeon of the city. After graduating M.B. from Queen's University in 1912 he became demonstrator in physiology and anatomy in the university. During the first world war he served with the Forces, but he was invalided out in 1917.

After taking the M.CH. in 1919 he was appointed to the staffs of the Ulster Hospital for Children and Women in 1920 and the Royal Victoria Hospital in 1921. He was also assistant to the professor of surgery. During the second world war he was officially commended by the King for his brave conduct during an air-raid on the Ulster Hospital in 1941. He retired in 1949.

C. H. G. M. writes:

Bobby John was one of the outstanding teachers and operators at the Royal Victoria Hospital and Ulster Hospital for Children and Women, and, as would be expected, he acquired an extensive surgical practice which often meant travelling long distances and operating in surroundings which today would be regarded as intolerable.

His clinical experience was enormous, and his capacity for imparting his knowledge made his classes most attractive to students. He was the guide, philosopher, and friend of the younger generation, and many of those who are now not so young remember with gratitude his help and counsel given so unstintingly at any time of the day or night.

He was greatly respected by all who worked with him and he forged personal links which remained unbroken throughout his professional life. His sense of humour in the earlier happier days made him the life and soul of the party; even the youngest were made to feel that they were part of it.

1. *Quart. J. Med.* 1933, **26**, 157.
2. *Lancet*, 1934, ii, 743.

Notes and News

MINISTRY OF PENSIONS AND NATIONAL INSURANCE

At the end of 1955, the Ministry[1] was paying 870,000 war pensions, family allowances to 3 1/4 million families, and under the National Insurance schemes about 4 1/2 million retirement pensions, 470,000 widows' benefits and guardians' allowances, and about 130,000 industrial-disablement pensions. During 1955, there were nearly 8 million new claims for sickness benefit, over 2 1/4 million for unemployment benefit, and over 830,000 for industrial-injury benefit. The cost of these and other social benefits being paid by the Ministry was at the rate of about £850 million a year. Family allowances in the year ended March 31, 1956, cost over £106 million—nearly £2 million more than in the previous year. The amount paid in benefits from the two insurance funds during the financial year ended March 31, 1955, was £522 million—about £12 million more than in the previous year. Of this £522 million, £496 1/2 million was paid from the National Insurance Fund and £25 1/2 million from the Industrial Injuries Fund. During the year £489 million was received in contributions from employers and insured persons to the National Insurance Fund (of which £40 million was paid to the National Health Service) and £33 million to the Industrial Injuries Fund.

Family allowances.—At the end of 1955 about 3 1/4 million families with 8 1/4 million children were receiving allowances of 8s. a week for each child after the first under the age-limit. At the beginning of the year 64% of the families had two children under the age-limits—i.e., were receiving one allowance of 8s.—and these families received about £43 3/4 million. Nearly 23 1/2% had three such children and received about £32 million; 8% had four, receiving about £16 1/2 million; 4 1/2% had five or more, receiving about £14 million. Family allowances will be increased to 10s. a week for third and younger children from Oct. 2 and the age-limit for school-children and apprentices was raised to 18 from Aug. 1.

Sickness benefit.—New claims in 1955 (53 weeks) totalled 7,919,000, compared with 7,173,000 the previous year (52 weeks). The number of current claims reached the peak (1,175,000) in the second half of January, fell to under 800,000 in early August, and rose to 924,000 in early November. Cost of sickness benefit for the year ended March 31, 1955, was £84 1/4 million.

Maternity benefits.—It is estimated that 746,000 maternity grants were awarded in the year ended Jan. 31, 1955, and that in the same period 287,000 home-confinement grants and 196,000 maternity allowances were awarded. The cost of maternity benefits in the year ended March 31, 1955, was £13 million.

Injury benefit.—The number of claims in 1955 was 831,000 (53 weeks), compared with 803,000 the previous year (52 weeks). The cost of the benefit in the year ended March 31, 1955, was more than £10 1/2 million.

Disablement benefit.—The rise in the number of claims continues. The number of disablement pensions in payment by October, 1955, was 127,000. At this date 70,000 special hardship allowances were in payment and constant-attendance allowance was being paid to some 1040 pensioners and to 490 men receiving workmen's compensation. About 570 hospital-treatment allowances were being paid. Total estimated cost of disablement benefit and supplementary allowances for the year ended March 31, 1955, was £13,174,000.

Medical boards made nearly 289,400 examinations in 1955. During the year 12,352 appeals were dealt with by fourteen medical appeal tribunals and 41·6% resulted in a decision for the claimant. A further 5102 cases were referred to the tribunals by direction of the Minister and, of these, 29·4% resulted in a variation of the assessment in the claimant's favour.

The number of National Insurance contributors at March 31, 1955, was nearly 23 3/4 million, of whom over 16 million were men. About 21 3/4 million were employed persons, nearly 1 1/2 million self-employed, and over 1/2 million non-employed.

A 19th-CENTURY CHARACTER

Samuel Smiles is generally remembered for his books *Self Help* and *Lives of the Engineers*, and it is not generally realised that he was for a time a general practitioner. In a biography[2] his granddaughter describes his apprenticeship, his period as a medical student at Edinburgh, and finally his not very successful attempts at practice at Haddington, East Lothian, and in the Leeds area. He led a restless life being at different times an editor, an administrator in the early days of the railways, and a popular biographer. This account is remarkable for the fascinating portrayal of the 19th-century background. "But the Sabbath Day was not without interest, for it was on Sunday that the cutty stool was used in the Kirk for those who had offended against the law of chastity. It was a terrible punishment, though not perfectly fair. The loose man would flee the town, leaving the loose woman to sit on the stool alone. On such Sundays, however, the Smiles children were left at home to read the Bible and Catechism." "To journey from

1. Annual report of Ministry of Pensions and National Insurance for 1955. Cmd. 9826. H.M. Stationery Office. 5s.
2. Samuel Smiles and his Surroundings. By AILEEN SMILES. London: Robert Hale. 1956. Pp. 206. 18s.

London to Sheffield was a beautiful adventure. Years afterwards, Granpa still spoke of it with relish. He went by sea to Hull, from Hull by steamer up the Humber to Thorne. From Thorne a coach took him to Sheffield. That was the way you travelled from London to Sheffield in 1838."

RAILWAY MEDICAL SERVICES

Mr. H. R. Rishworth, who has had much experience of railway medical administration in India and Iraq, was invited to investigate the medical conditions on the Nigerian railways; and he has recorded his findings, and his advice, in an excellent report.[1] This is divided into three parts. The first is devoted to the medical and sanitary services existing when he made the survey, the second to the administrative problems and the detailed recommendations, and the third to appendices. At the time the report was written the State-owned Nigerian railway system depended on the medical resources of the government for treatment of staff—a method tried for many years on certain railways in India, where it proved much less satisfactory than an independent and comprehensive service such as exists in other large Indian railways. A special medical department should be set up to undertake medical and surgical care of railway staff, to carry out the "industrial" medical functions special to railway working, and to assume responsibility for the sanitary care of railway areas. Mr. Rishworth goes into these questions in detail, discussing problems of staffing, finance, stores, buildings, and organisation. His comments and suggestions will be valuable to administrators planning any railway service in a tropical country, and to directors of medical services in those countries. The tone of his report is authoritative and clear; it is obviously the work of an expert.

University of Oxford

On July 28 the following degrees were conferred:

D.M.—T. C. Barns.

B.M.—*J. P. H. Anderson, Simon Ardeman, A. R. R. Cain, *Fred John, J. A. Lofting, P. G. Newall Watson, Ann G. Taylor.

* In absentia.

University of London

Dr. Norman Morris, first assistant in the obstetric unit at University College Hospital, has been appointed to the university readership in obstetrics and gynæcology tenable at the Institute of Obstetrics and Gynæcology.

Dr. Morris graduated M.B. Lond. from St. Mary's Hospital in 1943. After holding a resident appointment at East Ham Memorial Hospital he became registrar to the department of obstetrics and gynæcology at St. Mary's and later to the Institute of Obstetrics and Gynæcology. He took the M.D. and the M.R.C.O.G. in 1949. His published work includes papers on the use of hexamethonium compounds in pregnancy, on face and brow presentation, and on uterine blood-flow.

Dr. H. M. Pickard, lecturer in special anatomy and physiology and director of the conservation department at the Royal Dental Hospital of London, School of Dental Surgery, has been appointed to the university readership in conservative dentistry at the school.

Royal College of Surgeons of England

The honorary fellowship has been conferred on Dr. I. S. Ravdin, chairman of the board of regents of the American College of Surgeons and professor of surgery in the University of Pennsylvania.

Institute of Laryngology and Otology, London

On August 23, at 5.30 P.M., at the Institute, 330, Gray's Inn Road, W.C.1, Dr. John R. Lindsay, of Chicago, will give a lecture on vascular accidents as they affect vestibular function.

United States Public Health Service

Dr. Leroy E. Burney, an assistant surgeon-general, has been appointed surgeon-general of this service in succession to Dr. Leonard A. Scheele, who resigned in July.

Royal Institute of Public Health and Hygiene

Prof. Philip Drinker has been appointed Harben lecturer for 1956. He has chosen Air Pollution and the Public Health as the subject of his lectures, which he will deliver at the institute, 28, Portland Place, London, W.1, on May 13, 14, and 15, 1957.

1. A Report on the Medical and Sanitary Conditions on the Nigerian Railway, with Recommendations for a Railway Medical Service. H. R. RISHWORTH, C.B.E., F.R.C.S., D.P.H., late Principal Medical & Health Officer, Great Indian Peninsula Railway; Late Director Medical Services, Iraq State Railway. Printed for the Nigerian Railway Corporation by Wightman Mountain Limited, 1955.

University of Edinburgh

Mr. John Bruce, surgeon to the Western General Hospital, Edinburgh, has been appointed to the regius chair of clinical surgery in succession to Sir James Learmonth, who retires on Sept. 30. The chair of surgery, which Sir James also holds, is to be renamed the chair of surgical science, and Mr. M. F. A. Woodruff, at present Ralph Barnet professor of surgery in the University of Otago, New Zealand, has been appointed to it.

After graduating M.B. with honours at Edinburgh University in 1928, Mr. Bruce held surgical posts in Edinburgh at the Royal Hospital for Sick Children, Leith Hospital, and the Royal Infirmary. Later he was appointed to the honorary staffs of the Infirmary and of Leith Hospital. He was on active service with the R.A.M.C. for six years during the late war, and he was mentioned in despatches during the campaigns in Norway and Burma and was appointed C.B.E. while acting, in the rank of brigadier, as consulting surgeon with the 14th Army in the South-East Asia Command. Mr. Bruce is now lecturer in surgery and applied anatomy at Edinburgh University and has charge of the general-surgical and gastro-intestinal units at the Western General Hospital. He is president of the surgery section of the Royal Society of Medicine, and vice-president of the Royal College of Surgeons of Edinburgh.

Professor Woodruff, who is 45, studied at the University of Melbourne, where his father held the chair of bacteriology. He graduated first in electrical engineering and then in medicine in 1937. After appointments at the Royal Melbourne Hospital, Queen's College, and the university, he graduated M.D. in 1940 and M.S. in 1941. With the rank of captain in the A.R.A.M.C. he served in Malaya and he was taken prisoner in 1942. During his imprisonment he studied deficiency diseases, and his investigations were published as a Medical Research Council report. In 1946 he joined the surgical professorial unit in Sheffield, and with a World Health Organisation travelling fellowship he later visited the U.S.A. and Canada. In 1948 he became senior lecturer in surgery in the University of Aberdeen. He was appointed to his present chair in 1952. In 1951 he delivered a Hunterian lecture to the Royal College of Surgeons of England on transplantation of homologous tissues.

Society for General Microbiology

A meeting of this society will be held in the University of Exeter from Thursday to Saturday, Sept. 20 to 22.

Royal Masonic Hospital, London

The foundation-stone of the extension of this hospital at Ravenscourt Park was laid by the Earl of Scarborough, president of the hospital, on July 24. The building of the new wing was begun in February and, it is hoped, will be finished by the summer of 1958. It will cost approximately £700,000 and will provide about 80 beds, a department of pathology, a training-school for nurses, consulting-rooms for outpatients, a laundry and additional boiler facilities, a chapel, and accommodation for 35–40 resident staff.

Tobacco Manufacturers' Standing Committee

This committee has been set up, under the chairmanship of Sir Alexander Maxwell, by the Federation of Home and Export Tobacco Manufacturers, the British-American Tobacco Co., Ltd., and the Imperial Tobacco Co. (of Great Britain & Ireland), Ltd., to give "formal status to the coöperation in research of the group of manufacturers who in 1954 made a donation of £250,000 to the Medical Research Council for investigation into the causes of lung cancer." Sir Alfred Egerton, F.R.S., and Sir Ronald Fisher, F.R.S., are to act as scientific consultants to the committee. Other consultants are to be appointed. The offices of the committee will be at 6, Bruton Street, London, W.1.

The instrument rack for casualty surgery described by Dr. Gerald Ollerenshaw (*Lancet*, 1956, i, 190) is now obtainable from Messrs. John Bell & Croyden, Ltd., Wigmore Street, London, W.1.

The National Children's Home have published their 1956 convocation lecture, which was given by Prof. A. A. Moncrieff on The Changing Child. Copies (1s. 3d. post free) may be had from the home, Highbury Park, London, N.5.

A pamphlet on the *Planning of Mortuaries and Post-mortem Accommodation* has been issued by the Ministry of Housing and Local Government (H.M. Stationery Office. 1956. Pp. 5. 6d.).

Appointments

BOWEN, D. A. L., M.B. Camb., M.R.C.P.E., D.PATH.: S.H.M.O., pathology department, Royal Marsden Hospital, London.

HAMLIN, IRIS M. E., M.B. N.Z.: S.H.M.O., pathology department, Royal Marsden Hospital, London.

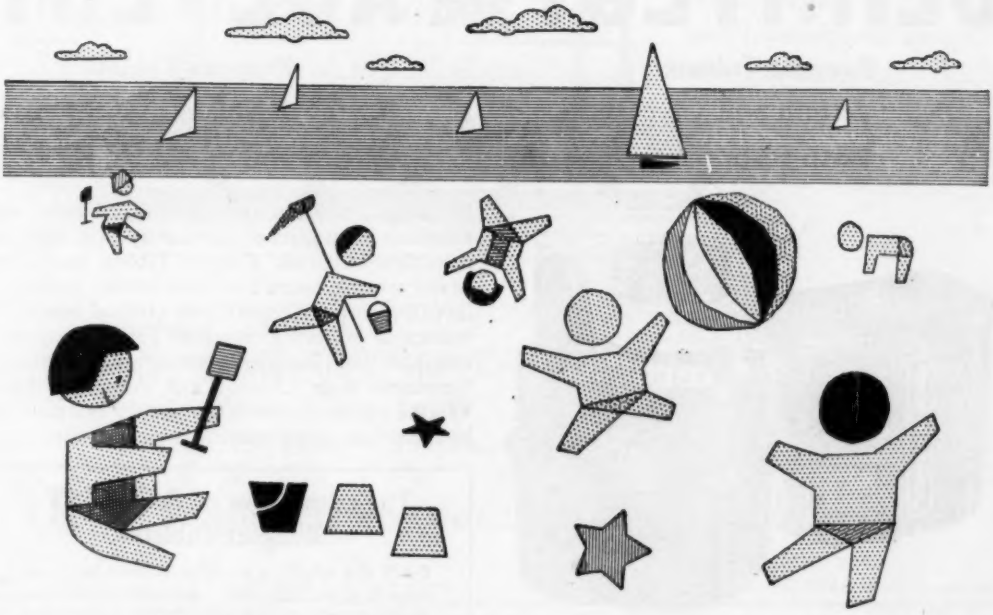
MEADE, AIDEN, M.B. N.U.I., D.C.H., D.P.H.: school M.O., Nottingham.

Births, Marriages, and Deaths

BIRTHS

WALTON.—On July 30, at the Queen Elizabeth Hospital, Birmingham, to Cynthia (formerly Morris) and Kenneth Walton, M.D., PH.D., a son—Peter Kenneth Henry.

IN "SUMMER DIARRHOEA"



Precisely how warm weather influences the incidence of infective diarrhoea in children is uncertain, but the increased number of flies and amount of dust makes it more likely that milk and food will become contaminated, while the rapid multiplication in warm weather of the various organisms known to be associated with the disease may lead to increased virulence.

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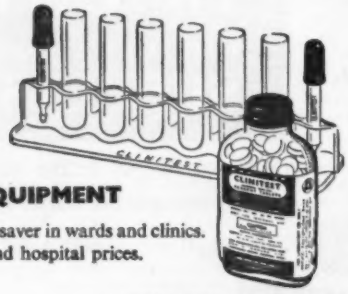

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REFERENCES

(1954) 'Clinical Tests for Ketonuria', *'Lancet', April 17th, pp. 801/804*
(1954) '*Medicine Illustrated*', *May, p. 289*
(1954) '*Practical Clinical Biochemistry*', *Heinemann, p. 74*
(1954) 'Clinical Tests for Ketonuria', *'Lancet', July 10th, p. 95*

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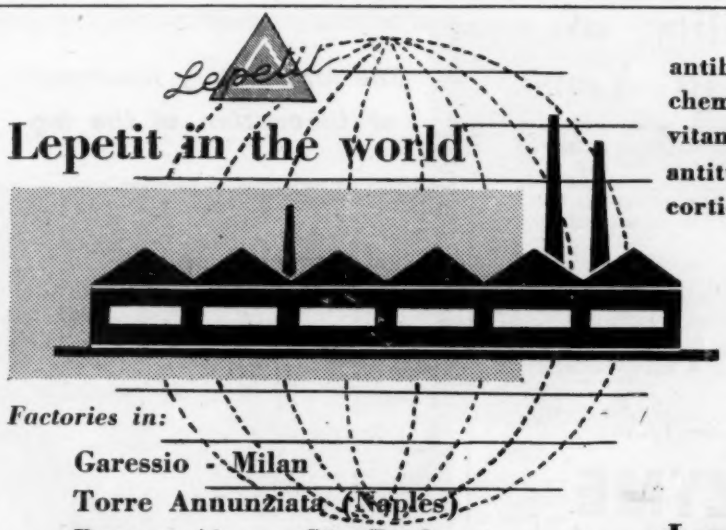

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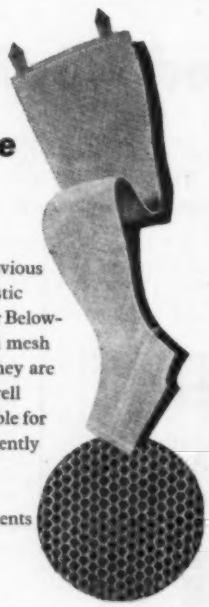

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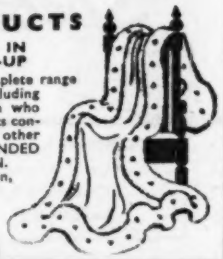

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Vacancies

ACADEMIC AND EDUCATIONAL SECTION *Page* 37

ANÆSTHETICS

Dulwich, S.E.22. Sr. H.O. 38
National Hosps. for Nervous Diseases, W.C.1. Reg. 39
Nelson, S.W.20. Sr. H.O. 39
Royal Free Hosp. Group. Sr. H.O. & H.O. 39
St. James', S.W.12. Sr. H.O. 40
St. Thomas's, S.E.1. Sr. Reg. .. 40
Wanstead, E.11. Sr. H.O. 40
Woolwich Group H.M.C. Sr. H.O.'s .. 40
Bedford Gen. Locum Reg. 41
Bristol Clinical Area. P.-t. Cons. .. 37
Bristol. Cossham/Frenchay H.M.C. H.O. or Sr. H.O. 41
Chesterfield Royal. Reg. 42
Dudley, Stourbridge & Dist. Sr. H.O. 43
Exeter. Royal Devon & Exeter. Sr. H.O. 43
Glasgow. Southern Gen. Sr. H.O. .. 43
Hemel Hempstead. West Herts & St. Paul's Hosps. Locum Sr. H.M.O. 37
Manchester R.H.B. Reg. 44
Newcastle R.H.B. Reg. 44
Nottingham Gen. Sr. H.O. 45
Oxford R.H.B. Reg. 45
Redhill County. Locum Reg. .. 45
Scotland. Eastern R.H.B. Cons. .. 38
Scotland. Western R.H.B. Sr. Reg. .. 46
Slough. Upton. Locum Reg. .. 46
Taplow. Canadian Red Cross Mem. Reg. 47
Warrington Gen. Sr. H.O. 47
Warrington Infy. Sr. H.O. 47

CASUALTY

Connaught, E.17. Sr. H.O. 38
North Middlesex, N.18. Sr. H.O. .. 39
Princess Beatrice, S.W.5. Sr. H.O. .. 39
Royal Free, W.C.1. Sr. H.O. .. 39
St. Giles', S.E.5. Sr. H.O. & H.O. .. 40
Wanstead, E.11. Sr. H.O. 40
Blackburn Royal Infy. Jr. H.M.O. or Sr. H.O. 42
Chelmsford & Essex. Sr. H.O. .. 42
Chesterfield Royal. Sr. H.O. 42
Croydon Gen. Reg. 42
Dudley, Stourbridge & Dist. Sr. H.O. 43
Enfield. Chase Farm. Locum Sr. H.O. 43
Grimsby Gen. Sr. H.O. 43
Hastings. Royal East Sussex. Sr. H.O. 43
Hemel Hempstead. West Herts. Locum Jr. H.M.O. 43

(continued overleaf)

Hertford County. Sr. H.O. or Locum 43
Huddersfield Royal Infy. Jr. H.M.O. 43
Leamington Spa. Warneford Gen. Sr H.O. 44
Lincoln No. 1 H.M.C. Locum Jr. H.M.O. 43
Plymouth. South Devon & East Cornwall. Sr. H.O... 45
Poole Gen. Sr. H.O. 45
Slough. Upton. H.O. 46
Southampton. Royal South Hants. Sr. H.O. 46
Southport Gen. Infy. Jr. H.M.O. .. 46
St. Albans City. Locum 46
Watford Peace Mem. Sr. H.O. & P.-t. Sr. H.O. 47
York County. Jr. H.M.O. 47

CHEST AND TUBERCULOSIS
London Chest, E.2. H.O.'s 39
North Middlesex Hosp. & Edmonton Chest Clinic, N.18. Sr. H.O. .. 39
Bovey Tracey. Hawkmoor Chest. Jr. H.M.O. 41
Braintree. Black Notley. Locum Reg. 41
Cardiff United Hosps. & Med. Research Council. Reg. 42
Derby. Derwent. Reg. 42
Leeds R.H.B. Reg. 44
North East Met. R.H.B. Reg. .. 39
Reading & Dist. H.M.C. Jr. H.M.O. 45
Skipton. Grassington. Jr. H.M.O. .. 46
Southend-on-Sea. Lancaster House Chest Clinic. Locum Sr. Reg. .. 46

DERMATOLOGY
Guy's, S.E.1. P.-t. Reg. 38
Welsh R.H.B. Reg. 47

EAR, NOSE, AND THROAT
Royal National T.N. & E., W. H.O. 39
Nottingham Gen. Sr. HO. 45
Wolverhampton Group. Sr. H.O. or H.O. 47

GERIATRICS
St. Francis', S.E.22. Sr. H.O. .. 40

INFECTIOUS DISEASES
Leeds R.H.B. Reg. 44
Plymouth. Scott Isolation. Sr. H.O. 45

MEDICINE
Central Middlesex, N.W.10. Reg. .. 38
St. George's, S.W.1. Reg. & Sr. Regs. 40
St. Giles', S.E.5. Sr. H.O. 40
Whipps Cross, E.11. H.O. & Pre-reg. H.O. 40
Aberdeen Special Hosps. B.O.M. H.O. 41
Aylesbury. Stoke Mandeville. H.O. 41
Bolton & Dist. H.M.C. Sr. H.O. .. 41
Bournemouth. Royal Victoria. H.O.'s 41
Cambridge. Addenbrooke's. Sr. Reg. 42
East Anglian R.H.B. Sr. Reg. .. 43
Epping. St. Margaret's. H.O.'s .. 43
Hillingdon, Middx. Reg. & H.O.'s.. 43
Hull. Kingston Gen. Pre-reg. H.O. 43
Kingston, Surrey. Pre-reg. H.O. .. 43
Kingston, Surrey. Reg. 43
Leeds R.H.B. Regs. 44
North East Met. R.H.B. Reg. .. 39
Portsmouth Group H.M.C. Pre-reg. H.O.'s 45
Reading Area Dept. of Medicine. Pre-reg. H.O.'s 45
Rochford, Essex. Gen. Pre-reg. H.O. 45
Romford. Rush Green. H.O... .. 45
Romford. Victoria. H.O. 45
Scotland. Eastern R.H.B. Reg. .. 46
Sheffield City Gen. Reg. 46
Southampton Gen. H.O. 46
Canada. University of Alberta Hosp. Asst. Supt. 38
Mullingar (Ireland) County. Reg. .. 47

NEUROLOGY
Hosp. for Sick Child, W.C.1. Sr. H.O. 40
National Hosps. for Nervous Diseases. Sr. H.O. or Reg. 39

NEUROSURGERY
Bristol. Cossham/Frenchay H.M.C. Sr. H.O.'s 41

OBSTETRICS AND GYNÆCOLOGY
German, E. 8. H.O. 38
Middlesex, W.1. Reg... 39
North East Met. R.H.B. Reg. .. 39
Queen Mary's Hosp. for the East End, E.15. Sr. H.O. & H.O. 39
St. Giles', S.E.5. Sr. H.O. 40
Ashton, Hyde & Glossop H.M.C. Sr. H.O. 41
Beverley. Westwood. Pre-reg. H.O. 41
Canterbury. Kent & Canterbury. H.O. 42
Croydon Group H.M.C. Locum Reg. 42
Epping. St. Margaret's. Sr. H.O. .. 43
Portsmouth Group H.M.C. Sr. H.O... 45
Stirling & Clackmannan Hosps. B.O.M. Pre-reg. H.O. 46
Stoke-on-Trent. City Gen. Pre-reg. H.O. 46
Stoke-on-Trent. North Staffs Royal Infy. Sr. H.O. 46

OPHTHALMOLOGY
Moorfields, Westminster & Central Eye, E.C.1. Reg. 39
St. Thomas's, S.E.1. P.-t. Sr. Reg. .. 40
Birmingham R.H.B. Sr. Reg. .. 41
Isleworth. South Middlesex. Sr. H.O. 43
Leeds R.H.B. Reg. 44
Manchester United Hosps. Sr. H.O. & Pre-reg. H.O. 44
North West Met. R.H.B. P.-t. Sr. H.M.O. 38
Oxford United Hosps. H.O... .. 45
Sheffield R.H.B. P.-t. Sr. H.M.O. .. 38

ORTHOPÆDICS
North East Met. R.H.B. Reg. .. 39
Alton. Lord Mayor Treloar Orthopædic. Locum Reg. 41
Beverley. Westwood. H.O. 41
Bournemouth. Royal Victoria. Sr. H.O. 41
Braintree. Black Notley. H.O. .. 41
Cardiff. Prince of Wales. Sr. H.O. .. 42
Chertsey. St. Peter's. Sr. H.O. or Pre-reg. H.O. 42
Croydon Gen. Locum Reg. 42
Croydon Group H.M.C. Reg... .. 43
Ilford. King George. Sr. H.O. .. 43
Louth County Infy. Reg. 44
Portsmouth Group H.M.C. Pre-reg. H.O. 45
Southampton. Royal South Hants. H.O. 46
Tunbridge Wells. Pembury. Sr. H.O. 46

PÆDIATRICS
Hosp. for Sick Child., W.C.1. Sr. H.O. 40
North East Met. R.H.B. Reg. .. 39
Queen Elizabeth Hosp. for Child. M.C. Sr. H.O. & H.O. 39
Queen Mary's Hosp. for the East End, E.15. H.O. 39
Whipps Cross, E.11. H.O. 40
Aylesbury. Stoke Mandeville. H.O. 41
Birmingham. Little Bromwich Gen. H.O. 42
Canterbury. Kent & Canterbury. H.O. 42
Ipswich & East Suffolk. Sr. H.O. .. 43
Manchester. West Manchester H.M.C. Sr. H.O. 44
Nottingham Child's. Sr. H.O. .. 45
Portsmouth Group H.M.C. H.O. .. 45
Reading. Royal Berks. H.O... .. 45
Warrington Gen. Sr. H.O. 47

PATHOLOGY
North East Met. R.H.B. Reg. .. 39
Royal Free Hosp. Group. H.O. .. 39
Royal Marsden, S.W.3. Sr. H.M.O. .. 37
St. Mary's, W.2, & North West Met. R.H.B. Sr. Reg. 40
Beverley. Westwood. Sr. H.O. .. 41
Bury & Rossendale H.M.C. Sr. H.O... 41
Leeds R.H.B. Sr. H.O.'s/Regs. .. 44
Manchester. Booth Hall & Monsall H.M.C. Sr. H.O. 44
Nottingham City. Sr. H.O. 45
Sheffield United Hosps. Sr. H.O. .. 46

PHYSICAL MEDICINE
Hosp. for Sick Child., W.C.1. Reg. 40

PLASTIC SURGERY
Scotland. South-Eastern R.H.B. Cons. 38

PSYCHIATRY
North East Met. R.H.B. Cons., P.-t. Cons. & P.-t. Sr. H.M.O. 37
Carlisle. Garlands. Jr. H.M.O. .. 42
Edinburgh. Royal Hosp. for Mental & Nervous Disorders. H.O. .. 43
Gloucester. Horton Road & Coney Hill Hosps. Jr. H.M.O.'s 43
Ilford. King George. P.-t. Clin. Asst. 43
Lancaster Moor. Sr. H.O. 43
Lancaster Moor. Locum Sr. H.M.O... 37
Lancaster Moor. Jr. H.M.O... .. 44
Leeds R.H.B. Regs. 44
Lichfield. St. Matthew's. Jr. H.M.O. 44
Manchester R.H.B. Sr. H.M.O. .. 37
Montrose, Angus. Royal Mental. Jr. H.M.O. 44
Newcastle R.H.B. Sr. H.M.O. & Locum Sr. H.M.O. 37/38
Nottingham. Saxondale. Reg. or Jr. H.M.O. 44
Scotland. South-Eastern R.H.B. Cons. 38
Sheffield R.H.B. Sr. H.M.O.'s .. 38
Sleaford. Rauceby. Locum Jr. H.M.O. 46
South East Met. R.H.B. Sr. H.M.O. 38

RADIOLOGY
Middlesex, W.1. Sr. H.O. 38
Royal Free, W.C.1. Sr. Reg. 39
Royal Northern, N.7. Reg. 39
Birmingham United Hosps. Sr. Reg. 41
Carshalton. St. Heller. Sr. Reg. .. 42
Colchester. Essex County. Locum Cons. or Sr. H.M.O. 37
Liverpool R.H.B. Sr. H.M.O. .. 37
Manchester R.H.B. Cons. 37
Scotland. South-Eastern R.H.B. Cons. 38
Sheffield United Hosps. Reg. .. 46
Australia. Queen Victoria Mem., Melbourne. Radiologist 38
Channel Islands. Jersey Gen. P.-t. Cons. 38

RADIOTHERAPY
Royal Northern, N.7, & Prince of Wales, N.15. Sr. H.O. 40
Manchester R.H.B. Cons. 37
Newcastle R.H.B. Reg. 44
Scotland. South-Eastern R.H.B. Reg. 46
Dublin. St. Luke's. Reg. 47

SURGERY
Bolingbroke, S.W.11. Reg. 38
Fulham, W.6. Reg. 38
German, E.8. Pre-reg. H.O. 38
Hosp. for Sick Child., W.C.1. Sr. H.O. 40
North East Met. R.H.B. Regs. .. 39
Putney, S.W.15. H.O. 39
Queen Mary's Hosp. for the East End, E.15. H.O. 39
South Western, S.W.9. Sr. H.O. .. 40
St. Andrew's, E.3. H.O. 40
Wanstead, E.11. H.O. 40
Whittington, N.19. Reg. 41
Alton. Henry Gauvain. Reg... .. 41
Beverley. Westwood. H.O. 41
Birmingham United Hosps. Reg. .. 41
Bolton Dist. Gen. H.O. 41
Bristol Clinical Area. P.-t. Cons. .. 37
Burton-on-Trent. Gen. H.O... .. 42
Canterbury. Kent & Canterbury. H.O. 42
Carshalton. Queen Mary's Hosp. for Child. Reg. & H.O. 42
Chelmsford & Essex. Pre-reg. H.O. 42
Crewe & Dist. Mem. Hosp. Sr. H.O. 42
Driffield. East Riding Gen. H.O. .. 42
Dudley, Stourbridge & Dist. Sr. H.O. 43
Hastings. Royal East Sussex. Pre-reg. H.O. 43
Kidderminster & Dist. Gen. Pre-reg. H.O. 43
Leigh (Lancs.) Infy. Reg. 44
Luton & Dunstable. Reg. 44
Maidstone. West Kent Gen. Pre-reg. H.O. 44
Manchester R.H.B. Regs. 44
Manchester. West Manchester H.M.C. Pre-reg. H.O.'s 44
Newmarket Gen. H.O. 44
Oxford United Hosps. Reg. 45
Portsmouth Group H.M.C. Sr. H.O.'s 45
Reading. Battle Hosp. H.O.'s .. 45
Reading Royal Berks. Pre-reg. H.O. 45
Richmond, Surrey. Royal. Sr. H.O. 45
Rochford, Essex. Gen. Locum Reg. 45
Romford. Oldchurch. H.O. 45
Scotland. Western R.H.B. Reg. .. 46
Sheffield R.H.B. Sr. Reg. 46
Shrewsbury. Royal Salop Infy/Copthorne. H.O. 46
Slough. Upton. Locum Sr. Reg. .. 46
South East Met. R.H.B. Reg. .. 46
St. Albans City. Locum Reg. .. 46
Sutton & Cheam. Reg. 46
Torquay. Torbay. Sr. H.O. 47
Wolverhampton Group. H.O. .. 47

THORACIC SURGERY
Aberdeen Gen. Hosps. B.O.M. Jr. H.M.O. 40

UROLOGY
St. Peter's, St. Paul's & St. Philip's Hosps., W.C.2. Sr. Reg. 40

PUBLIC APPOINTMENTS 47

GENERAL PRACTICE 48

NON-MEDICAL 48

MISCELLANEOUS 48

The Terms and Conditions of Service of Hospital Medical and Dental Staff apply to all N.H.S. hospital posts we advertise, unless otherwise stated. Canvassing disqualifies, but candidates may normally visit the hospital by appointment.

Academic and Educational

UNIVERSITY OF MANCHESTER

POSTGRADUATE COURSE IN GYNÆCOLOGICAL PATHOLOGY

A course will be held in the above subject from 1ST to 13TH APRIL, 1957, instruction being given by members of the staff of Manchester University, assisted by a number of visiting Lecturers from other centres. The course will provide a systematic account of the morbid anatomy and histology of the female genital tract and will include a brief review of vaginal cytology. Disorders of female physiology—including those peculiar to pregnancy—and human reproduction in general will also be discussed. An account will be given of maternal and perinatal death. Instruction will include lectures, clinical-pathological conferences and laboratory demonstrations with the microscope. It is hoped to issue to each student a collection of histological preparations which will remain in the student's possession at the conclusion of the course.

The course is particularly designed for Gynæcologists in training, and is also suitable for Clinical Pathologists. The fee will be £15 15s.

Further particulars and detailed syllabus may be obtained from the Dean of Postgraduate Medical Studies, The University, Manchester, 13, to whom applications should be sent by 31st December, 1956.

UNIVERSITY OF EDINBURGH

FACULTY OF MEDICINE

COURSE OF INSTRUCTION FOR THE NEW POSTGRADUATE DIPLOMA IN PSYCHIATRY

Part I. A part-time course will be given on one-and-a-half days a week throughout the year commencing in OCTOBER, fee £20. This course is integrated with the S.E. Regional Hospital Board training scheme for Psychiatrists and will be succeeded in October, 1957, by a full-time 6 months course in Psychiatry and Neurology, which will lead to the examination for Part II of the Dip. Psych.

Further particulars, regulations and syllabus for the Diploma, details of Training Schemes, and application forms may be obtained from the Dean of the Faculty of Medicine, University New Buildings, Teviot-row, Edinburgh, 8.

THE ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE

THE DIPLOMA IN PUBLIC HEALTH
THE DIPLOMA IN INDUSTRIAL HEALTH

The next COURSES OF INSTRUCTION for the above Diplomas will commence on 28TH SEPTEMBER, 1956. Tuition may be taken whole-time or part-time.

Prospectuses, enrolment forms and full details may be obtained from the Secretary, 28, Portland-place, London, W.1 (Telephone : LANgham 2731/2).

L.M.S.S.A.

FINAL EXAMINATION : SURGERY, 8th October, 12th November, 3rd December, 1956. MEDICINE, PATHOLOGY, 15th October, 19th November, 10th December, 1956. MIDWIFERY, 16th October, 20th November, 11th December, 1956. MASTERY OF MIDWIFERY, May and November. DIPLOMA IN INDUSTRIAL HEALTH, July and December.

For regulations apply REGISTRAR, Apothecaries Hall, Black Friars-lane, London, E.C.4.

UNIVERSITY COLLEGE HOSPITAL DENTAL SCHOOL. Applications are invited for the appointment of DEMONSTRATOR for duty at the University College Hospital Dental School, Great Portland-street, W.1. The appointment is for 3 sessions a week. The hours for morning sessions are 9.30 A.M.–12.30 P.M., afternoon sessions 2 P.M.–5 P.M. The appointment is for a period of 1 year commencing from 1st October, 1956. Salary £400 p.a.

Applications should be made to the Secretary, University College Hospital Medical School, University-street, W.C.1.

UNIVERSITY OF BRISTOL. The University invites applications for the post of ASSISTANT MEDICAL OFFICER to undertake the routine examination of students and to assist in the treatment of students. The Officer may also be required to undertake part-time teaching or research work. Salary £1200–£1400 p.a. according to qualifications and experience. Children's allowance scheme.

Applications, including the names of 3 referees, should reach the undersigned, from whom further particulars may be obtained, not later than 3rd September, 1956.

H. C. BUTTERFIELD, Registrar and Secretary.

THE UNIVERSITY OF LIVERPOOL. Department of STUDIES IN PSYCHOLOGICAL MEDICINE. Applications are invited for the post of RESEARCH ASSISTANT IN PSYCHOLOGICAL MEDICINE at a salary within the range £1000–£1200 p.a., according to qualifications and experience. The appointment will be tenable for 1 year and may be renewed for a second year.

Applications, stating age, academic qualifications and experience, together with proposed subjects of research and the names of 3 referees, should be received not later than 24th August, 1956, by the undersigned from whom further particulars of the conditions of appointment may be obtained.

STANLEY DUMBELL, Registrar.

THE UNITED CARDIFF HOSPITALS. Medical PROFESSORIAL UNIT. Research Fellowship. Applications are invited for appointment to a RESEARCH FELLOWSHIP IN MEDICINE in the Professorial Unit of the Welsh National School of Medicine at the Cardiff Royal Infirmary. The appointment, at a salary of £1100 p.a. with superannuation, is normally tenable for a period of 2 years. The person appointed will be able to take part in the teaching and routine work of the Department.

Further particulars about this appointment, and forms of application are available from the Secretary to the Board at the Cardiff Royal Infirmary, Cardiff. Applications should be returned by 31st August.

Hospital Services : Senior Appointments

NORTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD.

Full-time CONSULTANT PSYCHIATRIST, Severalls Hospital, Colchester.

Part-time CONSULTANT PSYCHIATRIST, Edmonton Child Guidance Clinic, N.18 (2 sessions a week).

Part-time ASSISTANT PSYCHIATRIST (Senior Hospital Medical Officer grade), Mid-Essex Child Guidance Clinic, Chelmsford (5 sessions a week).

Applications (6 copies), and names of 3 referees, should reach the Secretary, 11A, Portland-place, London, W.1, by Saturday, 25th August, 1956.

ROYAL MARSDEN HOSPITAL, Fulham-road, S.W.3. Applications are invited for the post of Full-time ASSISTANT PATHOLOGIST (Senior Hospital Medical Officer grade) in the Department of Clinical Investigation.

Applications (12 copies), together with names of 3 referees, should be sent to the House Governor, to reach him not later than 25th August.

BRISTOL CLINICAL AREA. South-Western Regional HOSPITAL BOARD. Applications are invited for the appointment of a CONSULTANT SURGEON to Southmead Hospital, Bristol. The appointment will be held on a part-time basis (7 sessions). The successful candidate, in addition to duties at Southmead Hospital which will include supervision of the Casualty Department, will have charge of beds at the Walker Dunbar Hospital ; he will also be required to visit other hospitals in the Clinical Area as determined by the Regional Board from time to time.

Applications (12 copies), stating date of birth, qualifications and experience, together with the names and addresses of 2 referees, should be sent to the Secretary of the Regional Hospital Board, 27, Tyndalls Park-road, Bristol, 8, not later than 31st August, 1956.

BRISTOL CLINICAL AREA. South-Western Regional HOSPITAL BOARD. Applications are invited for the appointment of a CONSULTANT ANÆSTHETIST to the Bristol Clinical Area. The appointment will be held on a part-time basis (2 sessions). The successful candidate will work mainly at Southmead Hospital, Bristol, but may be required to visit other hospitals in the Clinical Area as determined by the Regional Board from time to time.

Applications (12 copies), stating date of birth, qualifications and experience, together with the names and addresses of 2 referees, should be sent to the Secretary of the Regional Hospital Board, 27, Tyndalls Park-road, Bristol, 8, not later than 31st August, 1956.

COLCHESTER. ESSEX COUNTY HOSPITAL. Locum RADIOLOGIST (Consultant or Senior Hospital Medical Officer grade) required from 24th August for 6 weeks, for duties at hospitals in the Colchester Group.

Applications to Group Secretary, Colchester Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

HEMEL HEMPSTEAD, HERTFORDSHIRE. WEST HERTS AND ST. PAUL'S HOSPITALS. Locum ANÆSTHETIST (Senior Hospital Medical Officer), required.

Applications, giving 2 names for reference, should be sent to the Secretary, West Herts Hospital, Hemel Hempstead, as soon as possible.

LANCASTER MOOR HOSPITAL, Lancaster. (Regional MENTAL HOSPITAL.) Locum ASSISTANT PSYCHIATRIST (Senior Hospital Medical Officer) required from 1st August, 1956, for several weeks. Previous psychiatric experience essential. Salary according to national scale and at present 31½ guineas per week, less residential charges. Accommodation for single person only.

Apply Medical Superintendent.

LIVERPOOL REGIONAL HOSPITAL BOARD. South LIVERPOOL GROUP. Applications are invited for the post of Whole-time ASSISTANT RADIOLOGIST (Senior Hospital Medical Officer) with duties at hospitals in the above Group but mainly at Sefton General Hospital (816 Beds). Applicants should possess a Diploma in Radiology and have had wide experience in radiology.

Forms of application from, and to be returned to, Dr. T. Lloyd Hughes, Senior Administrative Medical Officer, Liverpool Regional Hospital Board, 19, James-street, Liverpool, 2, to be received not later than 1st September, 1956.

VINCENT COLLINGE, Secretary to the Board.

MANCHESTER REGIONAL HOSPITAL BOARD.

(*a*) Whole-time CONSULTANT RADIOTHERAPIST, Christie Hospital and Holt Radium Institute, Manchester. F.F.R. essential, other higher medical or surgical qualifications desirable. 21st August, 1956.

(*b*) Whole-time or maximum Part-time Additional CONSULTANT RADIOLOGIST to the Blackburn and District Hospitals (Blackburn Royal Infirmary, Queen's Park Hospital, Blackburn, and Victoria Hospital, Accrington, &c.). Wide experience and higher qualifications essential. 27th August, 1956.

(*c*) Whole-time RESIDENT ASSISTANT PSYCHIATRIST (Senior Hospital Medical Officer) at Lancaster Moor Hospital, near Lancaster (2500 Beds). Good accommodation. All modern forms of treatment undertaken. Candidates should have had wide experience in psychiatry, D.P.M. desirable. 22nd August, 1956.

Application forms from the Senior Administrative Medical Officer to the Board, Cheetwood-road, Manchester, 8, to be returned by dates stated.

NEWCASTLE REGIONAL HOSPITAL BOARD. Winter-TON HOSPITAL, SEDGEFIELD. Locum Tenens PSYCHIATRIST (Senior Hospital Medical Officer) whole-time for 2/3 months.

Applications, with names and addresses of 3 referees, to Regional Psychiatrist, Walker Gate Hospital, Benfield-road, Newcastle upon Tyne, 6, immediately.

NEWCASTLE REGIONAL HOSPITAL BOARD. Cherry KNOWLE HOSPITAL, RYHOPE, near SUNDERLAND. (850 Beds.) ASSISTANT PSYCHIATRIST (Senior Hospital Medical Officer) whole-time. Candidates should normally hold a D.P.M. but applications will be considered from candidates with no previous practical experience in psychiatry who hold a higher medical qualification, have had wide experience in general medicine, including Senior Registrar posts, and intend to obtain a D.P.M. and specialise in psychiatry. The appointment is non-resident and the successful candidate will be required to reside in close proximity to the Hospital. Full particulars from Regional Psychiatrist.

Applications, with names and addresses of 3 referees, to Regional Psychiatrist, Walker Gate Hospital, Benfield-road, Newcastle, 6, within 28 days.

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. ASSISTANT OPHTHALMOLOGIST (5 half-days a week), Senior Hospital Medical Officer grade, at Hillingdon Hospital, Uxbridge (621 Beds). A higher Diploma in Ophthalmology necessary. Hospital may be visited by arrangement with Medical Director.

Application forms obtainable from, and returnable to, Secretary, North West Metropolitan Regional Hospital Board, 11a, Portland-place, W.1, before 17th September, 1956.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of Whole-time CONSULTANT RADIOLOGIST in the areas of the East and West Fife Boards of Management, vacant on 1st October, 1956.

Applications, giving particulars of age, qualifications and previous experience, together with the names of 3 referees, should be sent to the Secretary, South-Eastern Regional Hospital Board, Scotland, 11, Drumsheugh-gardens, Edinburgh, 3, by 1st September, 1956.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for a whole or maximum part-time appointment as CONSULTANT in the Regional Plastic Surgery Unit. Duties will be at Bangour General Hospital, the Royal Infirmary, Edinburgh, and the Royal Hospital for Sick Children, Edinburgh. In addition a plastic surgery service, at present based on Dundee, is provided for the Eastern Regional Hospital Board. In addition to a training in general, pediatric and plastic surgery, experience in the surgery of trauma and in the investigation of surgical metabolic problems would be an advantage.

Applications, giving particulars of age, qualifications and previous experience, together with the names of 3 referees, should be sent to the Secretary, South-Eastern Regional Hospital Board, Scotland, 11, Drumsheugh-gardens, Edinburgh, 3, by 1st September, 1956.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the whole-time appointment of DEPUTY PHYSICIAN-SUPERINTENDENT (Consultant grade) to the Dingleton Mental Hospital, Melrose. A house is available.

Applications, giving particulars of age, previous experience and qualifications, together with the names of 3 referees, should be sent to the Secretary, South-Eastern Regional Hospital Board, Scotland, 11, Drumsheugh-gardens, Edinburgh, 3, by 1st September, 1956. Further particulars on application.

SCOTLAND. EASTERN REGIONAL HOSPITAL BOARD. Anæsthetics. STRACATHRO HOSPITAL, BRECHIN, ANGUS. Applications are invited for the whole-time post of ANÆSTHETIST (Consultant) at Stracathro Hospital, near Brechin (a general hospital of 676 Beds), and Brechin Infirmary (a hospital of 106 Beds—50 general). Salary and conditions of service in accordance with national agreement.

Further particulars and forms of application from the Secretary to the Board, 430, Blackness-road, Dundee, with whom applications must be lodged not later than 1st September, 1956.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time SENIOR ASSISTANT PSYCHIATRIST required for Mapperley Hospital, Nottingham. House available. Salary scale £1575–£50–£2025 p.a.

Application forms and further details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 1st September, 1956.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time SENIOR ASSISTANT PSYCHIATRIST required for Pastures Hospital, Mickleover, near Derby. House available. Salary scale £1575–£50–£2025.

Application forms and further details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, 10. Forms to be returned by 1st September, 1956.

SHEFFIELD REGIONAL HOSPITAL BOARD. Part-time ASSISTANT OPHTHALMOLOGIST required for 3 notional half-days per week, with duties in school clinics in Derby. To work under the direction of the Consultant. Post vacant 25th December, 1956. Salary within Senior Hospital Medical Officer scale.

Application forms and further details from the Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, 10. Forms to be returned by 8th September, 1956.

AUSTRALIA. THE QUEEN VICTORIA MEMORIAL HOSPITAL, 172, Lonsdale-street, MELBOURNE, VICTORIA, AUSTRALIA. Applications are invited from duly qualified medical practitioners for the position of RADIOLOGIST-IN-CHARGE. Full-time appointment, with 2 half-days per week for honorary work, if required. Salary, according to experience, from £2500 p.a. Age-limit 45 years.

Applicants are required to state age and full details of qualifications and experience. Closing date for receipt of applications by the undersigned, 30th August, 1956.

NELL STEPHENSON, A/Manager and Secretary.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited to fill a vacancy for a Whole-time ASSISTANT PSYCHIATRIST to the mental defective institution at Darenth Park, Dartford, Kent. Candidates must have had wide experience in psychiatry and previous mental defective experience; possession of a higher qualification is desirable. Salary within the scale £1575–£50–£2025. Accommodation is available. Applicants may visit the Hospital.

Apply, stating nationality, age, sex, qualifications and experience, including details of present appointment and of war service, together with the names and addresses of 3 referees, to the Secretary, Advisory Appointments Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, by 25th August, 1956.

CHANNEL ISLANDS, JERSEY. GENERAL HOSPITAL. Applications are invited for the post of CONSULTANT RADIOLOGIST (part-time—7 sessions) at a salary of £1335 p.a., rising by 8 equal annual increments to a maximum of £1970 p.a. The post is vacant on 1st October, 1956. Private radiological practice available.

Applications to be submitted by 18th August, 1956, to the President, Public Health Committee, General Hospital, Jersey, C.I.

CANADA. UNIVERSITY OF ALBERTA HOSPITAL, EDMONTON, ALBERTA, CANADA, requires ASSISTANT SUPERINTENDENT (medical). Starting salary $7800 p.a. Annual increments of $500 to $9800.

Give full particulars, name referees, and enclose photograph first letter, to A. C. MCGUGAN, M.D., Superintendent.

University of Alberta Hospital, Edmonton, Alberta, Canada.

Hospital Services : Junior Appointments

BOLINGBROKE HOSPITAL, Wandsworth Common, S.W.11. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. SURGICAL REGISTRAR (resident), for 1 year in first instance from October. Holder required as part of his duties to act as Group Admissions Officer, alternate periods of 3 months.

Forms of application, to be returned completed within 14 days of this advertisement, from Group Secretary, Battersea and Putney Group Hospital Management Committee, 54, Upper Richmond-road, S.W.15.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. MEDICAL REGISTRAR (general) required at above Hospital, with duties mainly in Geriatric Department. This involves close liaison with general practitioners, and home visiting of patients. Whole-time. Non-resident except when on duty. Post vacant 30th November, 1956. Applicants may visit Hospital by direct appointment.

Application forms obtainable from, and returnable to, Group Secretary, Central Middlesex Group Hospital Management Committee, Park Royal, N.W.10, within 10 days.

CONNAUGHT HOSPITAL, Walthamstow, E.17. (118 Beds.) Applications are invited for the post of SECOND CASUALTY OFFICER with duties in the Department of Orthopædic and Traumatic Surgery (Senior House Officer grade). Recognised for F.R.C.S. Salary £745 p.a., less £150 p.a. for board, lodging, &c.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Hospital Management Committee, Forest Group, Langthorne-road, E.11.

DULWICH HOSPITAL, East Dulwich-grove, London, S.E.22. Applications invited for appointment as SENIOR HOUSE OFFICER (Anæsthetist), vacant from 17th September, 1956. Recognised for F.F.A.R.C.S. and D.A.; the Hospital is associated with King's College Hospital Medical School for undergraduate teaching purposes.

Applications, stating age, qualifications and experience, enclosing copy testimonials or names of 2 referees, to the Group Secretary, Camberwell Hospital Management Committee, Dulwich Hospital, East Dulwich-grove, S.E.22.

FULHAM HOSPITAL, St. Dunstan's-road, Hammersmith, W.6. Applications are invited for appointment as SURGICAL REGISTRAR. Post vacant 16th September, 1956. Candidates may visit the Hospital by arrangement with the Hospital Secretary.

Applications (6 copies) to be submitted by 24th August, 1956, on forms obtainable from, and returnable to, Group Secretary (L114), Fulham and Kensington Hospital Management Committee, 5, Collingham-gardens, London S.W.5.

GERMAN HOSPITAL, London, E.8. (General—157 Beds.) Applications are invited for the 6 months resident appointment (now vacant) of Pre-registration HOUSE SURGEON and should be sent immediately to Group Secretary, Hackney Hospital, London, E.9, quoting GH/PHS.

GERMAN HOSPITAL, Dalston, E.8. (General—157 Beds.) Applications for the 6 months resident appointment of registered HOUSE SURGEON (obstetrics and gynæcology), post now vacant, should be sent to Group Secretary, Hackney Hospital, London, E.9, quoting GH/HSO.

GUY'S HOSPITAL, S.E.1. Applications are invited for the post of Part-time REGISTRAR in the Dermatological Department at Guy's Hospital with attendance on 7 sessions per week. The appointment will be for 1 year in the first instance from 1st October, 1956.

Forms of application are obtainable from, and should be lodged with, the Superintendent, Guy's Hospital, London Bridge, S.E.1, not later than 24th August, 1956.

MIDDLESEX HOSPITAL, W.1. Applications invited from candidates reading for the D.M.R.D. for the post of SENIOR HOUSE OFFICER in the Department of X-ray Diagnosis. Preference will be given to candidates with a higher degree.

Forms of application obtainable from the Deputy Superintendent should be returned, naming 2 referees, by 31st August.

MIDDLESEX HOSPITAL, W.1. Applications invited for post of OBSTETRIC AND GYNÆCOLOGICAL REGISTRAR vacant 1st November. Duties at The Middlesex Hospital and The Hospital for Women, Soho.

Rules and application forms, obtainable from Deputy Superintendent, should be returned, naming 2 referees, by 31st August.

LONDON CHEST HOSPITAL. Hospitals for Diseases OF THE CHEST. 2 vacancies occur 1st October, 1956, for RESIDENT HOUSE PHYSICIAN. Appointment for 6 months, 4 in London, 2 at the Country Branch, near Letchworth, and post graded as House Officer. Duties include work in the Outpatient Department and Refill Clinic as well as in wards.

Applications, stating date of birth, qualifications with dates, and previous appointments held, with copies of 3 testimonials, should reach the undersigned not later than 17th August.

THOMAS BROWN, House Governor.

London Chest Hospital, E.2.

MOORFIELDS, WESTMINSTER AND CENTRAL EYE HOSPITAL (MOORFIELDS BRANCH), City-road, London, E.C.1. Applications are invited for the post of SIXTH HOUSE SURGEON (Registrar), non-resident. The appointment is for a period of 4 months from 1st November, 1956, and the holder of the post at the completion of that time will be eligible for appointment as Fifth, Fourth, Third, Second Resident Surgical Officer and subsequently as Senior Resident Officer, for similar periods.

Applications should be submitted on the official form obtainable from the undersigned, stating age and qualifications, together with testimonials and photograph, and be received not later than 24th August, 1956.

A. J. M. TARRANT, House Governor.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Applications are invited for the posts of RESIDENT MEDICAL OFFICER and HOUSE PHYSICIAN (resident) at Maida Vale Hospital for Nervous Diseases, London, W.9. Appointments in the first instance for 6 months, renewable. Grading as Senior House Officer or Registrar according to experience. Preference will be given to candidates holding a higher degree and previous neurological experience will be an asset.

Applications, with copies of 3 recent testimonials, should be sent to the Secretary at Maida Vale Hospital, not later than 25th August, 1956.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Applications are invited from registered medical practitioners for the appointment of ANÆSTHETIC REGISTRAR (resident). This post carries the grade of Registrar.

Applications, giving the names of 3 referees, to be sent to the undersigned not later than 27th August, 1956.

H. EWART MITCHELL, Secretary to the Board of Governors.
The National Hospitals for Nervous Diseases,
Queen-square, London, W.C.1.

NELSON HOSPITAL, Kingston-road, Merton, S.W.20. RESIDENT ANÆSTHETIST (Senior House Officer grade).

Applications, stating age, experience and qualifications, with copies of testimonials and the name of 1 referee, should be sent to the Group Secretary, St. Helier Hospital, Carshalton, Surrey.

NORTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD.

SURGICAL REGISTRAR (resident or non-resident), Oldchurch Hospital, Romford, Essex. Recognised for F.R.C.S.

SURGICAL REGISTRAR (resident or non-resident), St. Mary's Hospital for Women and Children, Plaistow, E.13.

ORTHOPÆDIC REGISTRAR (resident or non-resident), St. Andrew's Hospital, Bow, E.3. Recognised for F.R.C.S.

REGISTRAR in Obstetrics and Gynæcology (resident), Forest Gate Hospital, E.7. Recognised for M.R.C.O.G.

MEDICAL REGISTRAR (non-resident), Chase Farm Hospital, Enfield, Middlesex. Experience in pædiatrics desirable.

REGISTRAR in Diseases of the Chest (resident), Harold Court Hospital, Harold Wood, Essex, and Brentwood Chest Clinic.

REGISTRAR in Pathology (non-resident), Group Laboratory, Mile End Hospital, E.1. Recognised for D.C.P. Experience in morbid anatomy, histology and hæmatology desirable.

PÆDIATRIC REGISTRAR (non-resident), Queen Elizabeth Hospital for Children, Hackney-road, E.2. Post vacant 12th October. Experience in treatment of diseases of children essential.

Appointments subject to review after 1 year.

Application forms from Secretary, 11a, Portland-place, W.1, to be returned by 25th August.

NORTH MIDDLESEX HOSPITAL, Edmonton, N.18. CASUALTY OFFICER (Senior House Officer grade). 6 months appointment, starting 24th September. Non-resident. Recognised for F.R.C.S. 3 Casualty Officers employed; duties include service with the 3 main surgical units.

Applications, stating age, nationality, qualifications, experience, with copies of recent testimonials and/or names of 2 referees, to Secretary of Hospital.

NORTH MIDDLESEX HOSPITAL and EDMONTON CHEST CLINIC, London, N.18. SENIOR HOUSE OFFICER (tuberculosis), resident, required as Locum for 4 weeks from 24th September, to be followed by permanent appointment from 22nd October for 6 months in the first instance with possible extension to 1 year. Duties at above Hospital and Clinic under the direction of the Chest Physician. Further details on request.

Applications, stating age, nationality, qualifications, experience, with copies of recent testimonials and/or names of 2 referees, to Secretary of Hospital.

PRINCESS BEATRICE HOSPITAL, Earls Court, S.W.5. Applications are invited from registered medical practitioners for the post of RESIDENT CASUALTY OFFICER (some anæsthetic duties). Senior House Officer grade. Recognised for F.R.C.S.

Applications, stating age, qualifications, with 3 testimonials, to the House Governor immediately.

PUTNEY HOSPITAL, Lower Common, London, S.W.15. HOUSE SURGEON (resident), vacant 1st September, 1956. Open to registered practitioners and pre-registration candidates.

Apply Hospital Secretary, enclosing copies of 3 recent testimonials, by 15th August, 1956.

QUEEN ELIZABETH HOSPITAL FOR CHILDREN MANAGEMENT COMMITTEE, Hackney-road, E.2, Shadwell, E.1, and BANSTEAD WOOD, SURREY. HOUSE OFFICER. Appointment will be made for 2 consecutive periods of 6 months commencing 1st October, 1956. First period as House Physician and second as House Surgeon and Casualty Officer.

Application forms may be obtained from the Secretary at Hackney-road, and should be returned, with copies of not more than 3 testimonials, on or before 25th August, 1956.

QUEEN ELIZABETH HOSPITAL FOR CHILDREN MANAGEMENT COMMITTEE, Hackney-road, E.2, Shadwell, E.1, and BANSTEAD WOOD, SURREY. Applications are invited for the appointment of RESIDENT MEDICAL OFFICER (Male or Female), graded Senior House Officer, at Hackney-road, to become vacant 1st October, 1956. Candidates must have had experience in the treatment of sick children. The appointment will be for 1 year.

Application forms may be obtained from the Secretary at Hackney-road, and should be returned, with copies of not more than 3 testimonials, not later than 27th August, 1956.

QUEEN MARY'S HOSPITAL FOR THE EAST END, Stratford, London, E.15.

PÆDIATRIC HOUSE PHYSICIAN, commencing 17th September, 1956.

HOUSE SURGEON (post-registration), commencing 16th September, 1956.

SENIOR OBSTETRIC HOUSE SURGEON (Senior House Officer grade), commencing 1st October, 1956.

JUNIOR OBSTETRIC HOUSE SURGEON (post-registration), commencing 1st October, 1956.

Applications, with copies of recent testimonials, to Group Secretary, West Ham Group Hospital Management Committee, Stratford, E.15, by 25th August, 1956.

ROYAL FREE HOSPITAL. Applications are invited for the post of SENIOR REGISTRAR to the X-ray Department at the Royal Free Hospital. The post is non-resident for 1 year in the first instance. Duties to commence 1st October. Candidates should be registered medical practitioners of not more than 10 years standing and should hold the D.M.R.(D).

Formal applications, giving details of experience, &c., together with names of 3 referees, should be sent to the Secretary to the Board of Governors, Royal Free Hospital, Gray's Inn-road, W.C.1, not later than 1st September.

ROYAL FREE HOSPITAL. Applications are invited from registered medical practitioners for the post of SENIOR CASUALTY OFFICER at the Royal Free Hospital, Gray's Inn-road, W.C.1. The appointment is full-time, resident, for 6 months; duties to commence 1st October, 1956. Salary and conditions of service in accordance with those laid down by the Ministry of Health for Senior House Officers.

Application forms may be obtained from the Secretary, Royal Free Hospital, Gray's Inn-road, W.C.1, to whom they should be returned not later than 1st September, 1956.

ROYAL FREE HOSPITAL GROUP. Applications are invited for the post of JUNIOR RESIDENT ANÆSTHETIST. Applicants must be registered medical practitioners. The appointment is for 6 months, duties to commence on 1st October, 1956. Salary and conditions of service in accordance with the Ministry of Health scale for House Officers.

Application forms may be obtained from the Secretary, The Royal Free Hospital, Gray's Inn-road, W.C.1, to whom they should be returned not later than 25th August, 1956.

ROYAL FREE HOSPITAL GROUP. Applications are invited for the post of SENIOR RESIDENT ANÆSTHETIST. Applicants must be registered medical practitioners. The appointment is for 6 months from 1st October, 1956, with duties at the North Western Branch and Hampstead General Hospital. Salary in accordance with the Ministry of Health scale for Senior House Officers.

Application forms may be obtained from the Secretary, The Royal Free Hospital, Gray's Inn-road, W.C.1, to whom they should be returned not later than 25th August, 1956.

ROYAL FREE HOSPITAL GROUP. Applications are invited for the post of RESIDENT PATHOLOGIST (House Officer), vacant 1st September, 1956, from registered Men and Women practitioners. The post is for 6 months, renewable for a further 6 months. Salary and conditions of service in accordance with the scale laid down by the Ministry of Health for House Officers.

Application forms may be obtained from the Secretary, Royal Free Hospital, Gray's Inn-road, W.C.1, to whom they should be returned not later than 23rd August, 1956.

ROYAL NATIONAL THROAT, NOSE AND EAR HOSPITAL, Gray's Inn-road, W.C.1, and Golden-square, W.1. RESIDENT HOUSE SURGEON (post-registration post). Applications are invited for a 6 months appointment as from 1st September, 1956, with salary and conditions as laid down for House Officers in the terms and conditions of service in the National Health Service.

Applications, stating age, qualifications, full details of previous experience (particularly in this Specialty), with copies of 1–3 recent testimonials, should be sent to the House Governor without delay.

ROYAL NORTHERN HOSPITAL, N.7. North West METROPOLITAN REGIONAL HOSPITAL BOARD. REGISTRAR in Radiology (X-ray Diagnostic Department) required at above Hospital. Candidates should possess D.M.R.D. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, the Secretary, Royal Northern Hospital, Holloway-road, London, N.7, by 21st August, 1956.

ROYAL NORTHERN HOSPITAL, Holloway, and PRINCE OF WALES HOSPITAL, Tottenham. SENIOR HOUSE OFFICER (Trainee) for Radiotherapy Departments at above Hospitals which can be visited by appointment.

Applications, with copies of recent testimonials, to be sent to Hospital Secretary, Royal Northern Hospital, N.7, by 18th August, 1956.

SOUTH WESTERN HOSPITAL, Landor-road, S.W.9. RESIDENT HOUSE SURGEON (Senior House Officer grade) required to take charge of 32 surgical beds under the direction of the Surgical Consultant of Lambeth Hospital, Kennington; also to work under the E.N.T. Surgeon at the South Western Hospital. Recognised for the F.R.C.S.

Forms of application from the Secretary.

ST. ANDREW'S HOSPITAL, Devons-road, Bow, E.3. Applications are invited for the appointment of HOUSE SURGEON. Recognised pre-registration post. Vacant on 11th September, 1956. Post is tenable for 6 months.

Applications, stating age and qualifications, with copies of at least 1 testimonial, should be sent immediately to the Hospital Secretary, St. Andrew's Hospital, Bow, E.3.

ST. FRANCIS' HOSPITAL, Constance-road, East Dulwich, S.E.22. (373 geriatric and long-stay chronic sick.) CAMBERWELL HOSPITALS MANAGEMENT COMMITTEE. Applications invited for appointment as SENIOR HOUSE OFFICER (medical duties). Unit under direction of full-time Geriatrician; association with "half-way" home: pre-admission and follow-up outpatient clinics; facilities for investigations. Salary £745 a year, less charge for residence. Post vacant from 1st September.

Applications, stating age, qualifications and experience, enclosing copy testimonials, to the Group Secretary, Camberwell Hospitals Management Committee, Dulwich Hospital, S.E.22.

ST. MARY'S HOSPITAL, W.2, and the NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. (Combined appointment.) Applications are invited for the post of SENIOR REGISTRAR in Morbid Anatomy. The successful candidate will be required to take up his duties as soon as possible and will work during the first 2 years of his appointment in the new laboratories at Paddington General Hospital, where his duties will be concerned with autopsies and surgical pathology for Paddington General and St. Charles' Hospitals. The third and fourth years will be spent in the Department of Morbid Anatomy at St. Mary's Hospital.

Applications, stating nationality, date of birth, permanent address, qualifications with dates and details of National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, St. Mary's Hospital, W.2, not later than 29th August, 1956.

ST. PETER'S, ST. PAUL'S AND ST. PHILIP'S HOSPITALS. RESIDENT SURGICAL OFFICER (Senior Registrar grade) required for St. Peter's Hospital on 1st October, 1956. Applications invited from Male candidates on the British register who have completed their training in general surgery. Appointment for 6 months, with opportunity for a further 6 months if recommended. Candidates should be prepared to spend 1 year at the Hospital if required.

Applications (12 copies), with 12 copies of 3 recent testimonials, should reach the House Governor, St. Peter's Hospital, Henrietta-street, W.C.2, by 8th September, 1956.

ST. THOMAS'S HOSPITAL, London, S.E.1. Senior REGISTRAR to the Department of Anæsthetics for a period of 1 year in the first instance. Whole-time.

Applications, naming 2 referees, to the Clerk of the Governors by 31st August, 1956.

ST. THOMAS'S HOSPITAL, London, S.E.1. Senior REGISTRAR to the Ophthalmic Department for a period of 1 year in the first instance from 22nd October, 1956, to carry out 5 half-day sessions per week.

Applications, naming 2 referees, to the Clerk of the Governors by 31st August, 1956.

ST. GEORGE'S HOSPITAL, S.W.1. Applications are invited for 3 posts as FIRST ASSISTANT in General Medicine, 1 in the grade of Registrar and 2 in the grade of Senior Registrar, in the St. George's Hospital Group. All candidates should possess the Diploma of Membership of the Royal College of Physicians. The successful candidates will be required to take up duty on 1st December, 1956.

Applications, stating age, education, qualifications, experience, and the names of 2 referees, should reach the undersigned not later than 25th August, 1956.

P. H. CONSTABLE, House Governor.

ST. GILES' HOSPITAL, Camberwell, London, S.E.5. Applications invited for appointment as SENIOR HOUSE OFFICER (general medical duties), vacant from 21st September. Resident post.

Apply, giving details of age, qualifications and previous posts, with copy testimonials or names of 2 referees, to Group Secretary, Camberwell Hospital Management Committee, Dulwich Hospital, S.E.22, not later than 20th August.

ST. GILES' HOSPITAL, Camberwell, London, S.E.5. Applications invited for appointment as SENIOR HOUSE OFFICER (obstetrics and gynæcology), vacant from 26th September. Resident post.

Apply, giving details of age, qualifications and previous posts, with copy testimonials or names of 2 referees, to Group Secretary, Camberwell Hospital Management Committee, Dulwich Hospital, S.E.22, not later than 22nd August.

ST. GILES' HOSPITAL, Camberwell, S.E.5. Applications invited for appointment as SENIOR HOUSE OFFICER (casualty duties). Recognised for F.R.C.S. Vacant 16th September. Resident or non-resident.

Apply, giving details of age, qualifications and previous posts, with copy testimonials or names of referees, to Group Secretary, Dulwich Hospital, S.E.22, by 27th August.

ST. GILES' HOSPITAL, Camberwell, S.E.5. Applications invited for appointment as HOUSE OFFICER (casualty duties, with some general surgical, E.N.T. and eye beds). Resident; not pre-registration. Salary £525 p.a.

Apply to Group Secretary, Camberwell Hospital Management Committee, Dulwich Hospital, East Dulwich-grove, S.E.22, as soon as possible.

ST. JAMES' HOSPITAL, Balham, S.W.12. Senior House OFFICER (anæsthetics) required immediately. Post recognised for D.A. and F.F.A.R.C.S.

Applications, stating age, qualifications, experience and names of 2 referees, to Group Secretary, Wandsworth Hospital Group, at above address. (42729.)

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There will be vacancies for the following Senior House Officers on 15th November, 1956:—

1 HOUSE PHYSICIAN.

1 HOUSE SURGEON to the Orthopædic and Plastic Departments.

Further particulars and form of application, which must be returned not later than 3rd September, 1956, are obtainable from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There is a vacancy for a Full-time NON-RESIDENT REGISTRAR to the Department of Physical Medicine (Registrar grade). The post is recognised to count for 1 year towards the Diploma in Physical Medicine.

Further particulars and form of application, which must be returned not later than 3rd September, 1956, may be obtained from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There will be a vacancy on 1st November, 1956, for a RESIDENT OFFICER to the Neurological and Neurosurgical Department (Senior House Officer).

Further particulars and form of application, which must be returned not later than Monday, 3rd September, 1956, may be obtained from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

WANSTEAD HOSPITAL, Hermon Hill, London, E.11. (191 Beds.) HOUSE SURGEON required. Post vacant 15th September, 1956. Recognised for F.R.C.S.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

WANSTEAD HOSPITAL, Hermon Hill, London, E.11. (191 Beds.) Applications are invited for the post of RESIDENT ANÆSTHETIST (graded Senior House Officer). Salary £745 p.a., less £150 p.a. for board, lodging, &c. Recognised for the F.F.A.R.C.S. and D.A.

Applications, stating age, qualifications and experience together with copies of 2 recent testimonials, should be sent immediately to the Secretary, Hospital Management Committee, Forest Group, Langthorne-road, E.11.

WANSTEAD HOSPITAL, Hermon Hill, E.11. (191 Beds.) Applications are invited for the post of CASUALTY OFFICER (recognised for F.R.C.S.) graded Senior House Officer, vacant 29th August, 1956. Salary £745 p.a., less £150 p.a. for board, lodging, &c.

Applications, with full details and copies of 2 recent testimonials, to be sent immediately to Secretary, Hospital Management Committee, Forest Group, Langthorne-road, E.11.

WHIPPS CROSS HOSPITAL, London, E.11. Applica-tions are invited from fully registered medical practitioners for the post of HOUSE PHYSICIAN (post-registration) in the Pædiatric Department. Post recognised for the D.C.H. Vacant 3rd October.

Application forms from the Hospital Secretary to be returned by 20th August, 1956.

WHIPPS CROSS HOSPITAL, London, E.11. Applica-tions are invited for the following posts:—

HOUSE PHYSICIAN (general medicine), vacant 27th September. (This post is open to either post-registration or pre-registration housemen.)

HOUSE PHYSICIAN (pre-registration), General Medicine, vacant 1st October.

Application forms (please state which post applied for) from the Hospital Secretary, to be returned by 20th August, 1956.

WHITTINGTON HOSPITAL, N.19. Surgical Registrar required at above Hospital for General Surgical Unit of 56 Beds. Hospital may be visited by direct appointment.

Application forms from, and returnable to, Group Secretary, Archway Group Hospital Management Committee, 46, Cholmeley-park, N.6, by 21st August, 1956.

WOOLWICH GROUP HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICERS (anæsthetics). 1 at St. Nicholas Hospital, Plumstead, vacant now, and 1 at Memorial Hospital, Woolwich, vacant 18th August. Both posts recognised for F.F.A.R.C.S. and are for 6 months in the first instance and may be renewed. Possession of D.A. an advantage.

Apply to Group Secretary, Memorial Hospital, Shooters Hill, Woolwich, S.E.18.

ABERDEEN GENERAL HOSPITALS BOARD OF MANAGEMENT. WOODEND GENERAL HOSPITAL. Applications are invited for the appointment of JUNIOR HOSPITAL MEDICAL OFFICER in the Thoracic Surgery Department of the above Hospital. The post which is non-resident, is subject to the conditions of service issued by the Department of Health for Scotland.

Applications, giving details of qualifications and experience and the names of 2 referees, should be lodged with the Secretary, Aberdeen General Hospitals, 62, Queen's-road, Aberdeen, within 14 days of the appearance of this advertisement.

ABERDEEN SPECIAL HOSPITALS BOARD OF MANAGEMENT. 1 HOUSE OFFICER (pre- or post-registration) required immediately. The post offers experience mainly in eye and skin conditions and is classified for pre-registration purposes as quasi-medical. It is tenable for 6 months from 1st August, 1956, to 31st January, 1957, or earliest possible commencing date.

Applications, with full details, to Group Medical Superintendent, Royal Aberdeen Hospital for Sick Children, Westburn-drive, Aberdeen.

ALTON. HENRY GAUVAIN HOSPITAL. Lord Mayor TRELOAR GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of Whole-time REGISTRAR in hospital of 114 Beds for surgery, non-pulmonary tuberculosis and orthopædics. Post vacant early in September for 1 year, renewable for a second. Preference given to candidates holding F.R.C.S. Person appointed to act as Deputy to Surgeon-Superintendent. Residence in house near Hospital can probably be provided for married man.

Write for application form to the Secretary, Lord Mayor Treloar Group Hospital Management Committee, Treloar Hospital, Alton, Hants.

ALTON, HAMPSHIRE. LORD MAYOR TRELOAR ORTHOPÆDIC HOSPITAL. Required immediately Locum ORTHOPÆDIC REGISTRAR for holiday duty—probably 3 months; post provides experience in non-pulmonary tuberculosis and general orthopædics. Accommodation for single man now—for married man later possibly. Visit to Hospital welcomed.

Apply Secretary.

AMENDED ADVERTISEMENT

ASHTON, HYDE AND GLOSSOP HOSPITAL MANAGE-MENT COMMITTEE. SENIOR HOUSE OFFICER (obstetrics/gynæcology) required at Ashton-under-Lyne General Hospital. Bed complement 82 obstetric and 26 gynæcology. Recognised for M.R.C.O.G. Vacant 1st September, 1956 (previously advertised as vacant 4th August, 1956).

Applications, with copies of 2 testimonials, should be forwarded to the Group Secretary, Ashton-under-Lyne General Hospital, Ashton-under-Lyne, Lancs.

AYLESBURY, BUCKINGHAMSHIRE. STOKE MANDE-VILLE HOSPITAL. (609 Beds.) Applications are invited for the post of RESIDENT HOUSE PHYSICIAN in the Department of Medicine. Pre-registration post but registered practitioners may apply. Duties include responsibility for 20 acute medical beds and 15 tuberculosis beds. Post vacant 19th September, 1956.

Applications, with copies of 2 testimonials, to the Administrative Officer.

AYLESBURY, BUCKINGHAMSHIRE. STOKE MANDE-VILLE HOSPITAL. (609 Beds.) HOUSE PHYSICIAN for the Paediatric Department. The post qualifies for D.C.H. Duties will include care of children in Infectious Diseases Unit, Plastic Unit and Outpatients Department Royal Buckinghamshire Hospital. Recognised pre-registration post, applications from registered practitioners will be considered. Post vacant 10th September, 1956.

Apply, with copies of 2 testimonials, to the Administrative Officer.

BEDFORD GENERAL HOSPITAL. (439 Beds.) Locum ANÆSTHETIC REGISTRAR required 3 months commencing September or shorter period. Salary £17 10s. per week.

Applications and testimonials to Group Secretary, Bedford Group Hospital Management Committee, 3, Kimbolton-road, Bedford.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. (229 Beds.) HOUSE SURGEON (first, second, or third post), vacant early September. General surgical duties, some orthopædics. Offering good opportunity for general experience in busy acute general hospital. Married quarters available. Recognised for F.R.C.S. Approved pre-registration post. Fully qualified practitioners may apply.

Applications to Group Secretary.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. ASSISTANT PATHOLOGIST (Senior House Officer grade) required in Area Laboratory with attendance at Branch Laboratory, Driffield. Offers experience all branches of pathology. Salary £745.

Detailed applications to Group Secretary.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. (229 Beds.) Pre-registration HOUSE OFFICER in Obstetrics and Gynæcology, vacant mid-August. Hospital has Maternity Unit of 22 Beds and Gynæcological Annexe of 18 beds. Fully qualified practitioners may apply.

Detailed applications to Group Secretary.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. (229 Beds.) ORTHOPÆDIC HOUSE SURGEON (first, second, or third post). Married accommodation available. Offers good opportunity for general experience in busy acute general hospital. Approved pre-registration post. Fully qualified practitioners may apply. Recognised for F.R.C.S. Vacant now.

Apply Group Secretary.

BURY AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the resident post of SENIOR HOUSE OFFICER (pathology).

Apply, stating age, qualifications, experience, nationality, and names of 2 referees, to H. WILKINSON, Group Secretary.

Bury General Hospital, Bury, Lancs.

BOVEY TRACEY (near), SOUTH DEVON. HAWK-MOOR CHEST HOSPITAL. (214 Beds including Thoracic Surgery Unit of 43.) There will shortly be a vacancy for a JUNIOR HOSPITAL MEDICAL OFFICER. A house may be available for a married candidate.

Applications, stating age, qualifications and experience, with names of referees or copies of testimonials, to be addressed to the Medical Superintendent.

BOLTON AND DISTRICT HOSPITAL MANAGE-MENT COMMITTEE. RESIDENT MEDICAL OFFICER (Senior House Officer grade), tenable for 12 months. Successful candidate will be required to reside at Hulton Hospital (141 Beds). Married quarters available. Duties include care of infectious and dermatological cases and some surgical and geriatric cases and may include outpatients and inpatients duties in the hospitals of the Group.

Applications, stating age, nationality, qualifications, experience and the names of 2 referees, to Group Secretary, The Royal Infirmary, Bolton.

BOLTON DISTRICT GENERAL HOSPITAL. (604 Beds.) RESIDENT HOUSE SURGEON for general surgical duties, vacant early September, tenable for 6 months and recognised under Pre-registration Service Scheme. Also recognised for F.R.C.S.

Applications, stating age, nationality, qualifications, experience and the names of 2 referees, to Group Secretary, Bolton and District Hospital Management Committee, The Royal Infirmary, Bolton.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL. (494 Beds.) BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER (resident), orthopædic and casualty combined. The post which is now vacant is recognised for the F.R.C.S. examination and is normally tenable for 12 months.

Applications to the Hospital Secretary.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL, Shelley-road. BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of 2 HOUSE PHYSICIANS vacant 18th and 20th September. The appointments are recognised for pre-registration purposes.

Applications to the Hospital Secretary.

BRAINTREE, ESSEX. BLACK NOTLEY HOSPITAL. Locum REGISTRAR in Orthopædic and Renal Tuberculosis required from 1st to 28th October, 1956.

Applications to the Group Secretary, Colchester Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

BRAINTREE, ESSEX. BLACK NOTLEY HOSPITAL. (516 Beds.) Applications invited for post of HOUSE OFFICER (orthopædic surgery). Duties include care of cases from London Hospital Orthopædic Department. First, second, third or pre-registration post; tenable for 6 months. Recognised for F.R.C.S.

Applications, with copies of 3 testimonials, to Group Secretary, Colchester Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

BRISTOL. COSSHAM/FRENCHAY HOSPITAL MANAGEMENT COMMITTEE. FRENCHAY HOSPITAL. (542 staffed beds, expanding.) Applications are invited for SENIOR HOUSE OFFICER posts in the Regional Department of Neurosurgery. Vacancies will arise mid-August and at the end of September next. These posts offer useful surgical experience and the opportunity of gaining a working knowledge of neurological diagnosis. *Recognised for F.R.C.S.

Applications to the Secretary, Frenchay Hospital, quoting "N.S.F." 2 referees required.

BRISTOL. COSSHAM/FRENCHAY HOSPITAL MAN-AGEMENT COMMITTEE. Applications are invited for the appointment of RESIDENT ANÆSTHETIST at Frenchay Hospital (542 Beds, general medicine and surgery and regional departments of neuro, plastic and thoracic surgery). The appointment will be made either in the House Officer grade or in the Senior House Officer grade according to qualifications and experience of the successful candidate.

Applications, naming 2 referees, to be submitted to the Group Secretary, Frenchay Hospital, Bristol, by 31st August, 1956.

BIRMINGHAM. THE UNITED BIRMINGHAM HOS-PITALS. THE CHILDREN'S HOSPITAL, Ladywood-road, BIRMINGHAM, 16. Applications are invited for the post of SURGICAL REGISTRAR (non-resident), vacant 1st September, 1956. Excellent opportunities exist for performance of pædiatric surgery in close association with the Consultant Surgeons of the Teaching Hospital. Preference will be given to candidates holding a higher qualification. Residence in the Hospital will be required when the Resident Surgical Officer is absent.

Forms of application may be obtained from the House Governor, and should be returned immediately.

G. A. PHALP, Secretary to the Board of Governors.

BIRMINGHAM. THE UNITED BIRMINGHAM HOS-PITALS. Applications are invited for the post of SENIOR REGISTRAR in Radiodiagnosis (non-resident). Candidates must possess the D.M.R.D. Appointment for 1 year in the first instance. The successful candidate may be required to spend not more than 2 years in a selected hospital of the Birmingham Regional Hospital Board in accordance with an arrangement for the interchange of Registrars agreed between the 2 Boards.

Application forms may be obtained from the Secretary to the Board, United Birmingham Hospitals, Queen Elizabeth Hospital, Birmingham, 15, and should be returned to him not later than 25th August, 1956.

BIRMINGHAM REGIONAL HOSPITAL BOARD. Whole-time SENIOR REGISTRAR in Ophthalmology. Duties at North Staffordshire Royal Infirmary (455 Beds). Higher qualification/wide experience specialty essential. Resident or non-resident (3 miles radius of Hospital). Successful candidate may subsequently be required to spend not more than 2 years in a selected hospital of the United Birmingham Hospitals in accordance with the arrangements for the interchange of Registrars agreed between the 2 Boards.

Applications (15 copies), naming 3 referees, to Secretary, Regional Hospital Board, 10, Augustus-road, Birmingham, 15, before 27th August, 1956.

BIRMINGHAM, 9. LITTLE BROMWICH GENERAL HOSPITAL. PÆDIATRIC HOUSE PHYSICIAN (Male/Female), vacant 1st October, 1956. Recognised for D.C.H., includes duties infectious diseases wards, Neonatal Department, and clinics.

Apply Physician-Superintendent.

BLACKBURN. ROYAL INFIRMARY. (262 general beds.) JUNIOR HOSPITAL MEDICAL OFFICER or SENIOR HOUSE OFFICER (casualty and orthopædics) required 30th August, 1956. Post recognised for F.R.C.S. Junior Hospital Medical Officer post can be for any period up to 4 years and a starting salary above the minimum of the scale may be approved on account of special experience or qualifications.

Apply to Secretary, Blackburn and District Hospital Management Committee, Hospital Management Committee Office, Royal Infirmary, Blackburn, Lancs.

BURTON-ON-TRENT. THE GENERAL HOSPITAL. HOUSE SURGEON required at the above Hospital. Post recognised for pre-registration purposes.

Apply Group Secretary.

CANTERBURY. KENT AND CANTERBURY HOSPITAL. (277 Beds.) The post of GENERAL SURGICAL AND ORTHOPÆDIC HOUSE SURGEON, which is recognised for the F.R.C.S. Diploma, becomes vacant in mid-September, 1956. National Health Service salary and conditions.

Applications, together with 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CANTERBURY. KENT AND CANTERBURY HOSPITAL. (277 Beds.) The post of PÆDIATRIC HOUSE PHYSICIAN, recognised for D.C.H., includes work in the ward and Outpatient Department and also provides experience in the care of the newborn. Opportunities exist for the study of preventive medicine among children and child guidance work. Post vacant at the end of September, 1956. National Health Service salary and conditions.

Applications, together with 2 testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CANTERBURY. KENT AND CANTERBURY HOSPITAL. (277 Beds.) The post of OBSTETRIC HOUSE SURGEON, which is recognised for the M.R.C.O.G. and D.Obst. R.C.O.G. becomes vacant in mid-September, 1956. National Health Service salary and conditions.

Applications, together with 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CARDIFF. UNITED CARDIFF HOSPITALS (Llandough HOSPITAL) AND MEDICAL RESEARCH COUNCIL (PNEUMOCONIOSIS RESEARCH UNIT). Applications are invited for the post of REGISTRAR to spend part of his time in the Miners' Chest Diseases Treatment Centre at the above-mentioned Hospital and part in the Medical Research Council's Unit, where he will have an opportunity to assist with clinical trials. The Centre caters for all types of chest diseases.

Application forms can be obtained from the Secretary to the Board at Cardiff Royal Infirmary, Cardiff, and should be returned within 14 days of the appearance of this advertisement.

CARDIFF (near). PRINCE OF WALES ORTHOPÆDIC HOSPITAL, RHYDLAFAR, near CARDIFF. SENIOR HOUSE OFFICER required. Regional Orthopædic Centre for South Wales area of 220 Beds increasing to 290 and branch of 70 Beds. Outpatients clinic in Cardiff. Single accommodation at hospital at Rhydlafar.

Forms of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARLISLE. GARLANDS HOSPITAL. (1060 Beds.) Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER at the above Mental Hospital. Resident post. Flat is available for which a deduction will be made. Salary scale £775–£50–£1075 p.a. Appointment subject to the National Health Service superannuation regulations and to the conditions and terms of service laid down by the Minister of Health.

Applications, stating age, qualifications and experience, and the names of 2 referees, should be sent to the Medical Superintendent as soon as possible.

CROYDON GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for appointment of ORTHOPÆDIC REGISTRAR. Duties involving both orthopædic and fracture work. Previous orthopædic experience essential. Post vacant 20th October, 1956.

Application forms from Group Secretary, Management Committee, General Hospital, London-road, Croydon.

CROYDON GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum Tenens REGISTRAR (obstetrics and gynæcology) for period 3rd–16th September for duties mainly at Mayday Hospital (80 obstetric and 47 gynæcological beds) and St. Mary's Maternity Hospital (33 obstetric beds).

Full particulars, giving qualifications and experience, to G. A. PAINES, Group Secretary, Hospital Management Committee, General Hospital, Croydon.

CROYDON GENERAL HOSPITAL. (200 Beds.) Croydon GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. SENIOR CASUALTY OFFICER (Registrar status), post vacant. Busy department. Post recognised for Final F.R.C.S. examination. Accommodation may be inspected on application to Hospital Secretary.

Application forms obtainable from Group Secretary, Hospital Management Committee, General Hospital, London-road, Croydon, to be returned within 14 days.

CROYDON. GENERAL HOSPITAL. (200 Beds.) Locum Tenens ORTHOPÆDIC REGISTRAR required at General Hospital for period 1st October–13th October, 1956, inclusive.

Applications in writing to G. A. PAINES, Group Secretary, Hospital Management Committee, General Hospital, London-road, Croydon.

CAMBRIDGE. ADDENBROOKE'S HOSPITAL. Senior MEDICAL REGISTRAR for 1 year in first instance reviewable annually.

Apply, with full particulars and names of 3 referees, to Secretary by 18th August.

CARSHALTON, SURREY. QUEEN MARY'S HOSPITAL FOR CHILDREN. (A general children's hospital of 853 Beds.) HOUSE SURGEON (resident) for acute general surgery required for 6 months. Applicants must have completed 12 months Pre-registration Service.

Applications, stating age and qualifications together with 1 recent testimonial and the names of 2 referees, should be submitted to the Group Secretary by 18th August, 1956.

CARSHALTON. QUEEN MARY'S HOSPITAL FOR CHILDREN. (853 Beds.) SURGICAL AND ORTHOPÆDIC REGISTRAR required for duties which include 60 orthopædic beds and shared Registrar responsibility for 60 acute and general beds. Applicants are invited to visit the Hospital by appointment with the Physician-Superintendent.

Applications which should be made on forms obtainable from the Group Secretary should be returned by 18th August, 1956.

CARSHALTON, SURREY. ST. HELIER HOSPITAL. SENIOR RADIOLOGICAL REGISTRAR. Post vacant 1st October. Candidates may visit the Hospital by prior arrangement with the Director of Radiology (Tel. : Fairlands 4343—Ext. 37).

Forms of application, returnable by 25th August, obtainable from the Group Secretary, at above address.

CHELMSFORD AND ESSEX HOSPITAL. Applications are invited for the resident post of CASUALTY OFFICER (Senior House Officer). It is recognised for the F.R.C.S. and offers excellent experience in the treatment of fractures and diagnosis of acute medical and surgical emergencies. Opportunity is given for Casualty Officer to follow up his cases in the wards and to obtain operating experience in major theatre under the guidance of the Consultants or the Resident Surgical Officer. Off duty time is generous and the post is one likely to suit both an officer seeking a higher qualification in surgery or one intending General Practice. The vacancy will occur on 2nd September.

Apply Secretary, Chelmsford Hospital Management Committee, Chelmsford and Essex Hospital, Chelmsford.

CHELMSFORD AND ESSEX HOSPITAL. (162 Beds.) Applications are invited for the post of RESIDENT HOUSE SURGEON (pre-registration post). The post will become vacant on 30th August, and offers good surgical experience and is recognised for the F.R.C.S.

Applications, together with 2 recent testimonials, to the Secretary, Chelmsford Hospital Management Committee, London-road, Chelmsford.

CHERTSEY, SURREY. ST. PETER'S HOSPITAL (Late Botleys Park War Hospital). (430 Beds.) ORTHOPÆDIC HOUSE SURGEON required from 28th August, 1956. 100 orthopædic beds. Senior House Officer or House Officer (Intern grade). Post recognised for F.R.C.S. and Pre-registration Service. Preference given to provisionally registered candidates. Salary in accordance with terms and conditions of National Health Service.

Applications, together with names and addresses of referees, to be sent to the Physician-Superintendent, St. Peter's Hospital, Chertsey, as soon as possible.

CHESTERFIELD ROYAL HOSPITAL. (324 Beds. Recognised for the D.A. and F.F.A.R.C.S.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (anæsthetics) with additional duties when required at other hospitals in the group. Experience in all types of anæsthesia, except for neurosurgery, can be obtained in this group of hospitals. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 20th August, 1956, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

CHESTERFIELD ROYAL HOSPITAL. Senior House OFFICER required 1st October at above Hospital for Accident and Orthopædic Department. Post recognised for F.R.C.S. training and offers valuable experience. National salary and conditions.

Apply M. H. BOONE, Secretary, Chesterfield Hospital Management Committee.

CREWE AND DISTRICT MEMORIAL HOSPITAL. (108 Beds—Acute.) RESIDENT SENIOR HOUSE OFFICER (surgical) required at the above Hospital (approved for F.R.C.S.) to take up duties 18th August, 1956. Excellent surgical experience is available. Salary in accordance with Whitley Council scale.

Applications, giving full particulars, age, qualifications, experience, &c., together with 3 names for reference, to be sent to the Group Secretary, South Cheshire Hospital Management Committee, Barony Hospital, Nantwich, Cheshire.

DERBY. DERWENT HOSPITAL. (187 Beds.) Sheffield REGIONAL HOSPITAL BOARD. Whole-time REGISTRAR (chest and infectious diseases) required. Private quarters available. A Consultant Thoracic Surgeon attends this Hospital each week. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 20th August, 1956, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

DRIFFIELD, YORKSHIRE. EAST RIDING GENERAL HOSPITAL. (247 Beds.) HOUSE SURGEON (first, second, or third post) required now. Approved pre-registration post. Fully qualified practitioners may apply.

Apply Group Secretary, Westwood Hospital, Beverley, Yorkshire.

DUDLEY, STOURBRIDGE AND DISTRICT HOSPITAL GROUP. BIRMINGHAM REGION.

The Guest Hospital, Dudley (154 Beds)

SENIOR HOUSE OFFICER (casualty). Post now vacant.

SENIOR HOUSE OFFICER (anæsthetics). Post now vacant.

Wordsley Hospital, near Stourbridge (478 Beds)

SENIOR HOUSE OFFICER (surgical). Post vacant October, 1956.

Apply, Group Secretary, Guest Hospital, Dudley.

EAST ANGLIAN REGIONAL HOSPITAL BOARD. SENIOR MEDICAL REGISTRAR, United Norwich Hospitals. Main hospital Norfolk and Norwich (441 Beds). Trainee post. Higher qualification desirable.

Applications, stating age, experience and the names of 3 referees, to the Board's Senior Administrative Medical Officer, 117, Chesterton-road, Cambridge, by 20th August, 1956. Candidates invited to visit Hospital by direct arrangement with the Hospital Management Committee Secretary, Norfolk and Norwich Hospital.

EDINBURGH. ROYAL EDINBURGH HOSPITAL FOR MENTAL AND NERVOUS DISORDERS. Applications are invited for the post of HOUSE OFFICER to the Professorial Unit of the Jordanburn Nerve Hospital, which is attached to the Department of Psychological Medicine of Edinburgh University. The post, which ranks as a pre-registration appointment in medicine, entails inpatient and outpatient duties and will be vacant from 1st October, 1956. Accommodation may be available.

Applications, with particulars of experience, &c., and names of 2 referees, should be made within 2 weeks of the appearance of this advertisement to the Physician-Superintendent, West House, Morningside-place, Edinburgh.

ENFIELD. CHASE FARM HOSPITAL. Locum Senior HOUSE OFFICER required for casualty duties, 1st–14th October, 1956. Non-resident. Hours 9 A.M.–5.30 P.M. on Monday–Friday. 9 A.M.–1 P.M. Saturday.

Applications to Group Secretary, Enfield Group Hospital Management Committee.

EPPING. ST. MARGARET'S HOSPITAL. (480 Beds.) HOUSE PHYSICIANS (2) as from 23rd September, 1956. The appointments, which are in general medicine, are for 6 months, including duties at Honey Lane Hospital for part of this time.

SENIOR HOUSE OFFICER (obstetrics), vacancy occurring 21st September, 1956. Post recognised for D.Obst.R.C.O.G. Salary on national scale, less deduction for board, lodging, &c. Busy general hospital with easy access to London.

Applications, with 2 recent testimonials, to the Group Secretary, Epping Group Hospital Management Committee, "Oak Cottage," The Plain, Epping, Essex, by 23rd August, 1956.

EXETER. ROYAL DEVON AND EXETER HOSPITAL. Applications are invited from registered medical practitioners for the appointment of SENIOR HOUSE OFFICER (anæsthetics), resident or non-resident, vacant now. The post is recognised for the F.F.A.R.C.S. examination.

Applications, with copies of 2 recent testimonials, to the Hospital Secretary.

GLASGOW, S.W.1. SOUTHERN GENERAL HOSPITAL. SENIOR HOUSE OFFICER in Anæsthetics.

Write immediately to Secretary, Board of Management for Glasgow South-Western Hospitals, 1301, Govan-road, Glasgow, S.W.1.

GLOUCESTER. HORTON ROAD AND CONEY HILL HOSPITALS. (1450 Beds.) Applications invited for the appointment of 2 JUNIOR HOSPITAL MEDICAL OFFICERS. Hospital serves the North Gloucestershire Clinical Area including Gloucester, Cheltenham, Stroud and Forest of Dean. High admission-rate (800). All modern methods of treatment. New units provided for treatment of neurotics and alcoholics. Expanding outpatient services, long-stay annexes and social clubs. Encouragement and opportunity for study. Salary and conditions Whitley Council. Single accommodation available. Married accommodation a possibility.

Applications, with names of 3 referees, to Medical Superintendent within 14 days.

GRIMSBY GENERAL HOSPITAL, South-parade, GRIMSBY. Applications are invited for CASUALTY OFFICER (Senior House Officer grade) with some E.N.T. duties. Up-to-date Medical Library and reading facilities available.

Applications, giving names and addresses of 2 referees, to Hospital Secretary.

HEMEL HEMPSTEAD, HERTFORDSHIRE. WEST HERTS HOSPITAL. Locum CASUALTY OFFICER (Junior Hospital Medical Officer) required 20th August–1st September.

Applications, giving full details and 2 names for reference, should be sent to the Hospital Secretary at once.

HERTFORD COUNTY HOSPITAL. (171 Beds. Hospital situated 21 miles from London.) RESIDENT CASUALTY OFFICER (Senior House Officer grade) with attachment to Pædiatrician and Ophthalmic Consultant. Salary £745 p.a., less £150 p.a. residential emoluments. Recognised under F.R.C.S. regulations. Appointment to commence as soon as possible. Locum periods considered.

Apply, with full details and references, to Group Secretary, Hertford Hospital Management Committee, County Hospital, Hertford, Herts.

HILLINGDON HOSPITAL, Uxbridge, Middlesex. (621 Beds.) HOUSE PHYSICIANS (resident). Appointments recognised for M.D.(London) Branch 1, and for pre-registration House Officers, vacant middle September.

Apply, with copies of 3 recent testimonials, to Medical Director by 21st August.

HILLINGDON HOSPITAL, Uxbridge, Middlesex. (621 Beds.) MEDICAL REGISTRAR. Post vacant early September. Hospital may be visited by appointment.

Application forms obtainable from, and returnable to, Hospital Secretary by 21st August.

HASTINGS. ROYAL EAST SUSSEX HOSPITAL. (150 Beds.) SENIOR HOUSE OFFICER (casualty and orthopædic). Post vacant 20th August, 1956.

Apply to Hospital Administrator.

HASTINGS. ROYAL EAST SUSSEX HOSPITAL. (150 Beds.) HOUSE SURGEON (pre-registration post), vacant 25th September.

Apply to Hospital Administrator.

HUDDERSFIELD ROYAL INFIRMARY. (285 Beds.) Applications are invited for the post of CASUALTY OFFICER. The post, which is resident, is graded Junior Hospital Medical Officer and is recognised under the Fellowship regulations. Duties terminate at 7 P.M. daily with 1 night weekly on call.

Applications for the appointment, which will be vacant on 1st September, 1956, should be accompanied by copies of 3 recent testimonials and addressed to—

H. J. JOHNSON, Group Secretary.

The Royal Infirmary, Huddersfield.

HULL. KINGSTON GENERAL HOSPITAL. (419 Beds.) HULL A GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN (pre-registration post), resident, and tenable for 6 months. Vacant now.

Applications, with 2 recent testimonials, to the Hospital Secretary.

ILFORD. KING GEORGE HOSPITAL. There is a vacancy for a CLINICAL ASSISTANT in the Psychiatric Department at above Hospital. 2 sessions per week (Tuesday). Applicant must be able to carry out psychotherapy treatment and must also have had experience in child guidance. Remuneration in accordance with the terms and conditions of service of hospital medical and dental staffs (England and Wales), i.e., £175 p.a. per weekly half-day.

Applications, accompanied by testimonials, to be sent to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Group Secretary,

Ilford and Barking Group Hospital Management Committee,

King George Hospital, Ilford.

ILFORD. KING GEORGE HOSPITAL. (General Hospital—211 Beds.) There is a vacancy for a SENIOR HOUSE OFFICER (Orthopædic Department) at above Hospital. Salary will be at the rate of £745 p.a., less emoluments. Recognised for F.R.C.S.

Applicants should have been registered not less than 1 year and should send applications accompanied by copies of 3 testimonials to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Group Secretary,

Ilford and Barking Group Hospital Management Committee.

IPSWICH AND EAST SUFFOLK HOSPITAL. Heath ROAD WING, IPSWICH. (274 Beds.) Applications invited for the post of SENIOR HOUSE OFFICER (resident) to the Pædiatric Unit, vacant on 29th September. Recognised for D.C.H., and normally of 12 months tenure.

Detailed applications, with copies of 2 recent testimonials, to the Hospital Secretary.

ISLEWORTH. SOUTH MIDDLESEX HOSPITAL. SENIOR HOUSE OFFICER for Ophthalmic Unit (30 Beds), vacant mid-September.

Applications, stating age, nationality, qualifications and experience with copies of up to 3 recent testimonials, to Group Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, by 21st August 1956.

KIDDERMINSTER AND DISTRICT GENERAL HOS-PITAL. (112 Beds.) Applications are invited for the pre-registration post of HOUSE SURGEON at the above Hospital. Post vacant from 28th August.

Applications, with the names of 3 referees, to the Hospital Secretary.

KINGSTON HOSPITAL, Wolverton-avenue, Kingston-ON-THAMES. Applications are invited from suitably qualified and experienced medical officers for the post of Full-time MEDICAL REGISTRAR which is available on 1st September, 1956. The successful candidate will be required to live in the Hospital, or occupy a duty room when on duty, or reside conveniently near to the Hospital.

Forms of application are obtainable from the Group Secretary, Kingston Group Hospital Management Committee, 35, Coombe-road, Kingston-on-Thames, and should be returned to him as soon as possible.

KINGSTON HOSPITAL, Wolverton-avenue, Kingston UPON THAMES. KINGSTON GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the pre-registration post of HOUSE OFFICER (general medicine) which is available on 1st October, 1956.

Applications, stating age, qualifications and experience, together with 2 recent testimonials, should reach the Physician-Superintendent of the Hospital by 25th August, 1956.

LINCOLN NO. 1 HOSPITAL MANAGEMENT COM-MITTEE. Locum CASUALTY OFFICER required for a period of approximately 1 month from 20th August, 1956. Salary in accordance with the scale laid down for a Locum Junior Hospital Medical Officer.

Applications to be forwarded to Group Secretary, County Hospital, Lincoln.

LANCASTER MOOR HOSPITAL, Lancaster. (Regional MENTAL HOSPITAL.) Applications invited for post of SENIOR HOUSE OFFICER (resident). Board and residence for unmarried applicant available for which a charge of £140–£160 p.a. is made. Hospital, which has 2700 Beds, serves North Lancashire, Westmorland, and parts of the West Riding of Yorkshire, and has an admission-rate of almost 800 of which 80% are voluntary. All modern forms of treatment are carried out. Facilities afforded to attend D.P.M. course. Salary according to national terms and conditions of service.

Apply Medical Superintendent.

LANCASTER MOOR HOSPITAL, Lancaster. (Regional MENTAL HOSPITAL.) Applications invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER (resident). Unfurnished flat available for married applicants; furnished quarters for single persons. Hospital recognised for D.P.M. and facilities granted for attending neighbouring universities. All modern methods of investigation and treatment (deep insulin, &c.) carried out; outpatient clinics; Hospital serving North Lancashire and Lake District. Post for initial period of 4 years, but renewable if services satisfactory.

Applications, giving names and addresses of 2 referees, to Medical Superintendent.

LEAMINGTON SPA. WARNEFORD GENERAL HOSPITAL. (197 Beds.) CASUALTY OFFICER (Senior House Officer). Male or Female, resident or non-resident. Post vacant and suitable for one reading for higher qualifications, being recognised for F.R.C.S., affording contact with all Specialist Units in the Hospital.

Applications, with names and addresses of 3 referees, to Hospital Secretary.

LEEDS REGIONAL HOSPITAL BOARD. Registrar vacancies.

Chest Diseases

Leeds Chest Clinic and additional duties as required at Regional Sanatoria. Previous experience in diseases of the chest desirable. Accommodation for a single person only at Killingbeck Hospital.

Infectious Diseases

Castle Hill Hospital, Cottingham (167 I.D. beds). Resident.

General Medicine

(i) Wakefield A Group (80 general medical beds) with additional duties in the Wakefield B Group.

(ii) St. Luke's Hospital, Bradford (170 general medical beds). Non-resident.

Ophthalmology

St. James's Hospital, Leeds (22 eye beds—5600 new outpatients annually) and the Public Dispensary, Leeds. Non-resident.

Psychiatry

(i) Clifton Hospital, York (1100 Beds). Resident or non-resident.

(ii) Menston Hospital, near Leeds (2500 Beds). Resident.

(iii) Stanley Royd Hospital, Wakefield (1976 Beds).

If desired, facilities for attending Leeds University will be provided if the successful candidates are studying for the D.P.M.

Applications, stating age, qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 24th August, 1956.

LEEDS REGIONAL HOSPITAL BOARD (in association with the Leeds Medical School) invites applications from fully Registered Practitioners for admission on 1st October, 1956, to the Regional Pathological Training Scheme. The scheme involves 4 years training—2 as Senior House Officer and 2 as Registrar and subject to satisfactory progress the appointments are renewed annually.

Applications, stating age, qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, should be forwarded to the Secretary, Park-parade, Harrogate, not later than 24th August, 1956, from whom further details may be obtained on request.

LEIGH INFIRMARY, The Avenue, Leigh, Lancashire. (102 Beds.) REGISTRAR in General Surgery (resident) for the above acute general hospital. Post vacant 31st August recognised for F.R.C.S.

Applications to Secretary, Wigan and Leigh Hospital Management Committee, Knowsley House, Wigan.

LICHFIELD. ST. MATTHEW'S HOSPITAL, Burntwood, LICHFIELD. (1350 mental beds.) BURTON-ON-TRENT HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER (psychiatry) required. Resident accommodation available. Facilities for taking a D.P.M. course at Birmingham University.

Applications, with names of 2 referees, to Medical Superintendent.

LOUTH COUNTY INFIRMARY. (215 Beds.) Sheffield REGIONAL HOSPITAL BOARD. Whole-time RESIDENT or NON-RESIDENT REGISTRAR (orthopædics and casualty) required. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 20th August, 1956, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

LUTON AND DUNSTABLE HOSPITAL, Luton, Bedfordshire. (250 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Whole-time SURGICAL REGISTRAR required 1st September, 1956, at the above Hospital. The post is recognised for F.R.C.S. The Hospital may be visited by direct appointment.

Application forms obtainable from the Secretary, Luton and Hitchin Group Hospital Management Committee, St. Mary's Hospital, Luton, Beds, and returnable by 17th August, 1956.

MANCHESTER. BOOTH HALL AND MONSALL HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (pathology) resident, required to assist the Director of Pathology for the Group (Booth Hall Children's Hospital and Monsall Hospital). Salary £745 p.a., less £140 p.a. for residence. Post tenable for 1 year in the first instance.

Applications to be sent as soon as possible to the Group Secretary, Booth Hall Hospital, Manchester, 9.

MANCHESTER REGIONAL HOSPITAL BOARD. Applications are invited for a resident post of SURGICAL REGISTRAR at the North Lonsdale Hospital, Barrow-in-Furness. Post recognised for F.R.C.S.

Applications to Group Secretary, Barrow and Furness Hospital Management Committee, 105, Abbey-road, Barrow-in-Furness.

MANCHESTER REGIONAL HOSPITAL BOARD. RESIDENT SURGICAL REGISTRAR required in the Blackburn and District Group with duties mainly at Queen's Park Hospital, Blackburn (640 mainly general beds). Post recognised for F.R.C.S.

Application forms obtainable from the Secretary of the Committee, Royal Infirmary, Blackburn, Lancs.

MANCHESTER REGIONAL HOSPITAL BOARD. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. The Board invite applications from registered practitioners for the post of RESIDENT SURGICAL OFFICER (Registrar grade), at the Christie Hospital and Holt Radium Institute.

Applications, with full details, including the names of 2 referees, to be forwarded to the Group Secretary, Withington Hospital, Manchester, 20, immediately.

MANCHESTER REGIONAL HOSPITAL BOARD invites applications for the post of REGISTRAR in Anæsthetics. The main duties will be with the Stockport and Buxton Hospital Management Committee, with some duties in the Macclesfield and District Hospital Management Committee Group. The post is recognised for the D.A. and F.F.A.R.C.S., and would suit a candidate wishing to study for higher qualification.

Applications, stating age, qualifications, and experience, together with copies of 2 testimonials, to be addressed to the Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport.

MANCHESTER. WEST MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. PARK HOSPITAL, DAVYHULME. (General Hospital—433 Beds.) 3 HOUSE OFFICERS (general surgery) required, pre-registration. Posts recognised for F.R.C.S. examination. Posts vacant, mid-October, end October, mid-November respectively.

Application forms from Secretary.

MANCHESTER. WEST MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. PARK HOSPITAL, DAVYHULME. (General Hospital—433 Beds.) SENIOR HOUSE OFFICER (pædiatrics) required; previous experience essential. Hospital has a Midwifery Unit of 73 Beds, and the Children's Unit comprises 10 thoracic surgery, and 26 pædiatric beds catering for other specialties. Hospital recognised for training for Diploma in Child Health.

Application forms from Secretary.

MANCHESTER. UNITED MANCHESTER HOSPITALS. MANCHESTER ROYAL EYE HOSPITAL. Applications are invited for the following posts:—

SENIOR HOUSE OFFICER.

HOUSE OFFICER (pre-registration surgical post).

Applications, giving full details of age, nationality, qualifications, present and previous appointments with dates, and the names of 2 persons to whom reference may be made, should be forwarded to H. R. NORTH, General Superintendent.

Manchester Royal Eye Hospital.

MAIDSTONE. WEST KENT GENERAL HOSPITAL. (141 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the pre-registration post of HOUSE SURGEON. 6 months appointment. Post vacant now. Salary at the rate of £425, £475 or £525 according to experience. A deduction at the rate of £125 a year is made for board and lodging and other services provided.

Applications should be forwarded as soon as possible to the Administrative Officer at the Hospital.

MONTROSE, ANGUS, SCOTLAND. ROYAL MENTAL HOSPITAL. (944 Beds.) Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER (Male or Female). A self-contained house, partially furnished, is available for a married man. Single furnished quarters are also available. All subject to appropriate deductions. Previous experience in psychiatry is not essential. Salary and conditions of service in accordance with national scale.

Applications, stating age, qualifications and experience, together with the names and addresses of 2 referees, should be forwarded immediately to the Physician-Superintendent.

NEWCASTLE REGIONAL HOSPITAL BOARD. Regional CANCER SERVICE. REGISTRAR RADIOTHERAPIST (whole-time), mainly at Shotley Bridge General Hospital. Single accommodation available.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Newcastle Regional Hospital Board, Walker Gate Hospital, Benfield-road, Newcastle upon Tyne, 6, within 14 days.

NEWCASTLE REGIONAL HOSPITAL BOARD. North WEST DURHAM HOSPITAL MANAGEMENT COMMITTEE. REGISTRAR ANÆSTHETIST (whole-time), resident. Single accommodation available. Post recognised for F.F.A.R.C.S. and D.A. examinations.

Applications, with names and addresses of 3 referees, to be forwarded to Senior Administrative Medical Officer, Newcastle Regional Hospital Board, Walker Gate Hospital, Benfield-road, Newcastle upon Tyne, 6, within 14 days.

NEWMARKET GENERAL HOSPITAL, Suffolk. Applications are invited for the post of HOUSE SURGEON, now vacant. Duties include surgical house charge of general surgical E.N.T. Post resident and available for 6 months, recognised for pre-registration.

Applications, with copies of 3 testimonials, to the Medical Superintendent.

NOTTINGHAM (near). SAXONDALE HOSPITAL, Radcliffe-on-Trent, near NOTTINGHAM. (930 Beds. Recognised for D.P.M. examination.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time REGISTRAR or JUNIOR HOSPITAL MEDICAL OFFICER in Psychiatry required. Unfurnished house or self-contained flat available.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 20th August, 1956, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

NOTTINGHAM. CITY HOSPITAL. (811 Beds.) Applications are invited for the post of RESIDENT PATHOLOGIST (Senior House Officer). Previous experience an advantage. Post vacant 1st October, 1956.

Applications, stating age, nationality, qualifications and experience, together with copies of not more than 3 testimonials, to be sent to the Group Secretary, Sherwood Hospital, Hucknall-road, Nottingham.

NOTTINGHAM CHILDREN'S HOSPITAL. (136 Beds. Recognised for the D.C.H.) Applications are invited for the post of SENIOR HOUSE OFFICER (medical) becoming vacant early in September. The post is tenable for 6 months or a year by agreement.

Applications, with copies of 2 testimonials, should be sent to the Secretary, Nottingham Children's Hospital, Chestnut-grove, Nottingham.

NOTTINGHAM GENERAL HOSPITAL. E.N.T. Department. A SENIOR HOUSE OFFICER (E.N.T.) required at above Hospital. This post is recognised for the D.L.O. and F.R.C.S. examinations. Salary and conditions of service in accordance with Ministry regulations. Duties to commence about 1st September.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to Group Secretary.

NOTTINGHAM GENERAL HOSPITAL. Senior House OFFICER (anæsthetics) required as soon as possible. The post is recognised for the D.A., and the F.F.A.R.C.S. This is a busy general hospital giving experience in all branches of surgery.

Applications, stating age, nationality, qualifications and experience, together with copies of testimonials, to be sent to the Group Secretary.

OXFORD REGIONAL HOSPITAL BOARD. Anæsthetic REGISTRAR to the Swindon Group of hospitals. Duties will be mainly at the Victoria Hospital (96 Beds). The post is recognised for the D.A., and F.F.A.R.C.S., and provides good experience. Residential accommodation for a single person is available.

Applications on forms obtainable from the Secretary, Registrar Committee, 43, Banbury-road, Oxford, should reach him by 25th August, 1956.

OXFORD. UNITED OXFORD HOSPITALS. Applications invited for the post of HOUSE OFFICER in the Oxford Eye Hospital, with effect from 1st October, 1956.

Applications, stating age, qualifications, and experience, together with names of 2 referees, to the Administrator, Radcliffe Infirmary, Oxford, by 24th August, 1956.

OXFORD. UNITED OXFORD HOSPITALS. Applications are invited for the resident post of REGISTRAR in General Surgery at the Radcliffe Infirmary from 1st September, 1956, for 1 year in the first instance.

Applications, on forms obtainable from the Administrator, Radcliffe Infirmary, Oxford, should be received not later than 20th August, 1956.

PLYMOUTH. THE SCOTT ISOLATION HOSPITAL. PLYMOUTH SPECIAL HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER from Male registered medical practitioners who have preferably been qualified for 1 year and have had previous hospital experience. The applicant should be able to drive a car. The duties, in 2 departments, will be chiefly in connection with infectious and venereal diseases, the former including a substantial proportion of cases in children. The varied clinical work, including acute medical cases and early pulmonary tuberculosis, provides valuable experience, particularly to those reading for a higher medical degree. The appointment will be for 1 year, vacant on 1st October next.

Applications, together with copies of 2 recent testimonials, should be sent to the Group Secretary, Plymouth Special Hospital Management Committee, 8, Nelson-gardens, Stoke, Plymouth, before 30th August, 1956.

PLYMOUTH. SOUTH DEVON AND EAST CORNWALL HOSPITAL. CENTRAL CASUALTY DEPARTMENT. SENIOR HOUSE OFFICER in Casualty, vacant 1st September, 1956, recognised for the F.R.C.S.

Applications, stating age, nationality, qualifications and experience, with names of 3 referees, to be sent to—

ARTHUR R. CASH, Group Secretary, Plymouth, South Devon and East Cornwall General Hospital Group, 7, Nelson-gardens, Stoke, Plymouth.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE.

Queen Alexandra Hospital

(*a*) SENIOR HOUSE OFFICER for Gynæcological Department (39 Beds), vacant now. Recognised for M.R.C.O.G.

(*b*) SENIOR HOUSE SURGEON (87 surgical beds), vacant 1st September, 1956.

Royal Portsmouth Hospital

(*a*) HOUSE OFFICER (pre-registration), Orthopædic Department (104 Beds), vacant now.

(*b*) HOUSE PHYSICIAN (pre-registration) (65 medical beds), vacant 17th August.

(*c*) SENIOR HOUSE SURGEON (70 surgical beds), vacant 19th September, 1956.

Saint Mary's Hospital

(*a*) HOUSE PHYSICIAN (pædiatric), vacant 15th August. Pædiatric Unit of 53 Beds, the post is recognised for candidates preparing for the D.C.H.

(*b*) HOUSE PHYSICIAN (pre-registration) (74 medical beds), vacant 13th August.

Applications, stating age, experience and qualifications, together with the names of 2 referees, should be forwarded as soon as possible to E. H. HURST.

35, Grove-road South, Southsea.

POOLE GENERAL HOSPITAL. Bournemouth and EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. CASUALTY OFFICER (Senior House Officer) required to commence duty on 20th August, 1956. Post suitable for persons reading for higher diplomas.

Applications to the Hospital Secretary.

READING AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of JUNIOR HOSPITAL MEDICAL OFFICER in the Area Department of Diseases of the Chest, for duty in the Reading Chest Clinic. The post offers wide experience in both tuberculous and non-tuberculous chest diseases and duties will include attendance at Prospect Park Hospital, Reading, and Peppard Chest Hospital, Henley. Facilities are available for postgraduate studies. Salary within the scale £775–£1075 p.a.

Applications, stating age and qualifications, together with names of 3 referees, should be sent to the Group Secretary, 3, Craven-road, Reading.

READING AREA DEPARTMENT OF MEDICINE. Applications are invited from provisionally registered medical practitioners for 3 posts as RESIDENT HOUSE PHYSICIAN all vacant 1st September, 1956, for a period of 6 months. Successful applicant will be required to carry out duties at the following Reading Hospitals: Royal Berkshire (399 Beds), Battle (301 Beds), Prospect Park (104 Beds).

Write immediately, stating age, qualifications with dates, nationality, present post with copy of a recent testimonial, to the Secretary, Royal Berkshire Hospital, Reading.

READING. BATTLE HOSPITAL. (391 Beds.) Applications are invited from registered medical practitioners for 2 posts of RESIDENT JUNIOR HOUSE SURGEON in the Area Accident and Orthopædic Department. 1 vacant immediately the other 1st October next. F.R.C.S. recognised. Also casualty duties. Salary £425–£525 p.a., less £125 board-residence.

Apply, stating age, qualifications with dates, nationality, present post, with 1 copy of recent testimonial, to Hospital Secretary.

READING. ROYAL BERKSHIRE HOSPITAL. (399 Beds.) Applications are invited from provisionally registered medical practitioners, Male and Female, for resident post of HOUSE SURGEON, vacant 21st August, 1956, and tenable for 6 months.

Write immediately, stating age, qualifications with dates, nationality, present post with copy of 1 recent testimonial, to the Secretary.

READING. ROYAL BERKSHIRE HOSPITAL. (399 Beds.) READING AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered and provisionally registered medical practitioners for the resident post of HOUSE PHYSICIAN in the Pædiatric Department; vacant 15th September for 6 months.

Write, before 3rd September, stating age, qualifications with dates, nationality, present post, with 1 copy of recent testimonial, to Secretary.

REDHILL COUNTY HOSPITAL, Earlswood Common, REDHILL, SURREY. Locum ANÆSTHETIC REGISTRAR required for 2 weeks from 3rd September. Single accommodation provided. Salary £17 10s. per week.

Apply Group Secretary, Redhill Hospital Management Committee, Earlswood Mount, Pendleton-road, Redhill (Redhill 3581—Ext. 20).

RICHMOND, SURREY. ROYAL HOSPITAL. (Acute General Hospital—121 Beds.) SENIOR HOUSE OFFICER in Surgery required. Resident post available for 6 or 12 months, vacant 11th September, 1956.

Applications immediately to Administrative Officer.

ROCHFORD, ESSEX. GENERAL HOSPITAL. Locum SURGICAL REGISTRAR required from 1st to 16th September, 1956. Post resident and married accommodation available if required.

Applications, &c., to the undersigned as soon as possible.

J. C. FIELD, Secretary.

ROCHFORD, ESSEX. GENERAL HOSPITAL. (622 Beds.) HOUSE PHYSICIAN (pre-registration) required, vacant 15th September, 1956.

Applications, &c. (1 testimonial only necessary from pre-registration applicant seeking first post) to be sent to the undersigned by 25th August, 1956. J. C. FIELD, Secretary.

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. (301 Beds.) RESIDENT HOUSE PHYSICIAN required from 6th September, 1956. This Hospital provides for acute medical and surgical patients in addition to a limited number of fever cases. The post, which is also open to pre-registration candidates, offers good opportunities for gaining experience in both general medicine and fever.

Applications should be addressed immediately to Medical Superintendent stating also names of 2 referees.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) RESIDENT HOUSE SURGEON required from 29th September, 1956, in the General Surgical Unit at the above Hospital. Recognised for F.R.C.S. This very active General Surgical Unit of a total of 180 Beds affords ample opportunities for candidates to obtain first-class tuition and experience. The candidate appointed will be attached to a unit of approximately 60 Beds.

Applications should be forwarded immediately to Group Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

ROMFORD, ESSEX. VICTORIA HOSPITAL. (99 Beds.) RESIDENT HOUSE PHYSICIAN (Male) required early in September, 1956. Post not approved for pre-registration purposes.

Applications should be forwarded to the Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of REGISTRAR in Radiotherapy at the Royal Infirmary and the Western General Hospital, Edinburgh.

Applications, giving particulars of age, qualifications and previous experience, together with the names of 2 referees, should be submitted to the Secretary, South-Eastern Regional Hospital Board, Scotland, 11, Drumsheugh-gardens, Edinburgh, 3, by 1st September, 1956.

SCOTLAND. EASTERN REGIONAL HOSPITAL BOARD. General Medicine. STRACATHRO HOSPITAL, BRECHIN. Applications are invited for the post of REGISTRAR in Medicine at Stracathro Hospital, Brechin (a general hospital of 675 Beds—150 medical). Salary and conditions of service in accordance with national agreement.

Further particulars and forms of application from the Secretary to the Board, "Braeknowe," 430, Blackness-road, Dundee, with whom applications must be lodged not later than 25th August, 1956.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the following appointments, which will be for 1 year in the first instance :—

SENIOR REGISTRAR in Anæsthetics based at Law Hospital, Carluke.

REGISTRAR in Surgery based at Broadstone Hospital, Port Glasgow.

These appointments are subject to the National Health Service (Scotland) superannuation regulations.

Applications (12 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, by 25th August, 1956.

SHEFFIELD. CITY GENERAL HOSPITAL. (652 Beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time NON-RESIDENT MEDICAL REGISTRAR required with duties also at Fir Vale Infirmary. General medical experience would be gained at the City General Hospital and geriatric experience at Fir Vale Infirmary. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 27th August, 1956, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT or NON-RESIDENT SENIOR SURGICAL REGISTRAR (transitional appointment) required at City General Hospital, Sheffield, for 1 year in first instance. The successful candidate to reside at the hospital when "on call." Applications invited from Senior Surgical Registrars in their fourth or subsequent years and from those who held such posts for 3 years or more but vacated them after 1st January, 1951.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 20th August, 1956, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS. Applications invited for the non-resident post of REGISTRAR to the Department of Radiology at the Royal Infirmary/Royal Hospital Units.

Applications, with the names of 3 referees, should be sent not later than 18th August, 1956, to the Chief Administrative Officer, The United Sheffield Hospitals, West-street, Sheffield, 1.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS. RESIDENT PATHOLOGIST (Senior House Officer) required from 1st October, 1956. Appointment forms part of a training scheme for candidates for the M.R.C.O.G. examination. If eligible the holder will be able to apply for transfer to a clinical appointment in the Hospital in due course.

Applications, with copies of 3 recent testimonials, should be sent at once to the Superintendent, Jessop Hospital for Women, Leavygreave, Sheffield, 3.

SHREWSBURY. ROYAL SALOP INFIRMARY/COPTHORNE HOSPITAL. (500 Beds.) HOUSE SURGEON, vacant 2nd September, 1956. Pre-registration candidates eligible. Recognised for the F.R.C.S.

Applications, with copy testimonials, to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SLEAFORD, LINCOLNSHIRE. RAUCEBY HOSPITAL. RESIDENT LOCUM TENENS (Junior Hospital Medical Officer grade) required immediately for above Mental Hospital. £17 10s. per week, less £3 for board, residence and laundry. This Hospital provides experience in all branches of psychiatry.

Applications to be sent to the Group Secretary, Harmston Hall, Lincoln.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for a whole-time appointment as RESIDENT SURGICAL OFFICER to fill a vacancy in the approved establishment at the Sidcup and Swanley Group of hospitals. The successful candidate will be required to reside at Queen Mary's Hospital, Sidcup. Married quarters are available. The salary will be £965 p.a. and the appointment will be in accordance with the terms and conditions of service of hospital medical and dental staffs (England and Wales), and will be for 1 year in the first instance, renewable for a further year.

Applications, giving particulars of age, qualifications and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, London, W.1, not later than 25th August, 1956.

SOUTHEND-ON-SEA. LANCASTER HOUSE CHEST CLINIC. Locum SENIOR REGISTRAR required for 4 weeks commencing 20th August. Previous experience in chest work essential. Accommodation available if required.

Apply immediately to J. C. FIELD, Secretary, Management Committee Offices, General Hospital, Rochford, Essex.

SOUTHAMPTON GENERAL HOSPITAL. (471 Beds.) RESIDENT HOUSE PHYSICIAN required mid-September. Pre-registration candidates eligible.

Applications, with copies of testimonials, should be forwarded as soon as possible to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (278 Beds. Recognised for F.R.C.S.) CASUALTY OFFICER (Senior House Officer grading) required.

Applications, with copies of testimonials, to be submitted as soon as possible to the Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (278 Beds.) ORTHOPÆDIC HOUSE SURGEON required. Post recognised for Pre-registration Service and tenable for 6 months. The Hospital is the centre to which all trauma from a large industrial town and port is directed thus providing excellent experience in the treatment of traumatic conditions ; patients with orthopædic conditions are also drawn from a wide area.

Applications, with copies of testimonials, should be sent as soon as possible to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHPORT GENERAL INFIRMARY. Junior HOSPITAL MEDICAL OFFICER (resident). Whole-time casualty post.

Apply, stating age, nationality, qualifications, experience and copies of 2 recent testimonials, to Group Secretary, Southport and District Hospital Management Committee, Promenade Hospital, Southport.

SKIPTON (near). GRASSINGTON HOSPITAL. (208 Beds.) JUNIOR HOSPITAL MEDICAL OFFICER required for the above Hospital, which provides treatment for tuberculosis patients, men and women. Accommodation available for single applicants. Post tenable from 1st September, 1956, or earlier if desired.

Applications to Medical Superintendent.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. Locum SENIOR SURGICAL REGISTRAR required 27th August–17th September.

Applications, with names of 2 referees, to Secretary.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. WINDSOR GROUP HOSPITAL MANAGEMENT COMMITTEE. CASUALTY HOUSE OFFICER required, 1 of 2, for busy Casualty Department. Experience provided in orthopædic and plastic cases. Salary on House Officer scale plus £50 p.a.

Applications, together with names of 2 referees, to Secretary.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. WINDSOR GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum ANÆSTHETIC REGISTRAR required from 25th August to 8th September, inclusive.

Applications, with names of 2 referees, to Secretary.

ST. ALBANS CITY HOSPITAL, St. Albans, Hertfordshire. (384 Beds). Locum Tenens CASUALTY OFFICER required for the period 1st–16th September, inclusive.

Applications to Secretary, Mid Herts Group Hospital Management Committee, Bleak House, Catherine-street, St. Albans.

ST. ALBANS CITY HOSPITAL, Normandy-road, St. ALBANS. (384 Beds.) Locum Tenens SURGICAL REGISTRAR required for 1 of the 2 general surgical teams for the period 10th–30th September, inclusive.

Applications to the Secretary, Mid Herts Group Hospital Management Committee, Bleak House, Catherine-street, St. Albans.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. HOUSE OFFICER (obstetrics and gynæcology) required, vacant 3rd September. Pre-registration post. Recognised for M.R.C.O.G. and D.Obst.R.C.O.G.

Applications to Hospital Management Committee Secretary, Princes-road, Stoke-on-Trent, as soon as possible.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (Gynæcology Department.) SENIOR HOUSE OFFICER required. Post vacant very shortly. Recognised for M.R.C.O.G. (Surgery). Experience in abnormal obstetrics available, but the work is mainly gynæcological.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STIRLING AND CLACKMANNAN HOSPITALS BOARD OF MANAGEMENT. Applications are invited for the post of RESIDENT HOUSE SURGEON (obstetrics and gynæcology) at Stirling Royal Infirmary for the 6-month period commencing 1st October, 1956. This is a pre-registration post and is recognised for the M.R.C.O.G.

Applications, along with 2 names for reference, should be sent to the Group Medical Superintendent, Stirling Royal Infirmary.

SUTTON AND CHEAM HOSPITAL, Cotswold-road, SUTTON, SURREY. SURGICAL REGISTRAR. Post vacant mid-October. Candidates may visit Hospital by prior arrangement with Secretary (Tel. VIGilant 8691).

Forms of application, returnable by 25th August, obtainable from the Group Secretary, St. Helier Hospital, Carshalton, Surrey.

TUNBRIDGE WELLS (near). PEMBURY HOSPITAL, PEMBURY. Applications invited for appointment of HOUSE SURGEON (Senior House Officer) to Orthopædic Unit. Post vacant 1st September, 1956 ; recognised for F.R.C.S. (Eng.) and tenable for 1 year. Work includes treatment of long and short stay cases and traumatic surgery with large outpatient and fracture clinics. National Health Service salary, less £150 p.a. for board, lodging, &c. Accommodation for a married man could be arranged.

Apply, stating age, qualifications and experience with 3 testimonials, to Group Secretary, Tunbridge Wells Group Hospital Management Committee, Sherwood Park, Pembury-road, Tunbridge Wells.

TORQUAY. TORBAY HOSPITAL. Resident Senior HOUSE OFFICER (surgery) required early September, 1956. Post recognised for F.R.C.S. There is a complement of 6 Resident House Officers.

Applications, stating qualifications, age, nationality, with copies of testimonials (quoting Ref. F. 955/72) to the Group Secretary, Torquay District Hospital Management Committee, Torbay Hospital, Torquay, S. Devon.

TAPLOW, near MAIDENHEAD. CANADIAN RED CROSS MEMORIAL HOSPITAL. RESIDENT ANÆSTHETIC REGISTRAR required at above Hospital. Post recognised for F.F.A.R.C.S.

Application forms obtainable from, and returnable to, Secretary, Windsor Group Hospital Management Committee, Alma-road, Windsor, by 24th August.

WELSH REGIONAL HOSPITAL BOARD. Registrar in Dermatology. Based at St. David's Hospital, Cardiff, will assist in the Region and in Regional Skin Clinics and will also be expected to undertake duties in the Department of Dermatology at the United Cardiff Hospitals. Non-resident. Subject to review end of first year.

Application forms from Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 14 days.

WATFORD, HERTFORDSHIRE. PEACE MEMORIAL HOSPITAL. (208 Beds.) SENIOR HOUSE OFFICER (casualty) required for part-time duties in modern department to assist 2 full-time Casualty Officers. Times of duty can be adjusted to suit applicant and amount to approximately 26 hours per week.

Applications, with names of 2 referees, to the Administrator.

WATFORD, HERTFORDSHIRE. PEACE MEMORIAL HOSPITAL. (208 Beds.) SENIOR HOUSE OFFICER (casualty) required for full-time duties in modern department. 2 other Casualty Officers employed. Post recognised for F.R.C.S., vacant 20th August.

Applications, with names of 2 referees, to the Administrator.

WARRINGTON GENERAL HOSPITAL. (344 Beds.) Applications are invited for the post of RESIDENT ANÆSTHETIST (Male or Female), graded as Senior House Officer. The Hospital is recognised for the D.A. examination. Salary is £745 p.a., less a deduction of £150 p.a. for residential emoluments.

Applications, stating qualifications and experience, should be sent to— H. L. BOOT, Group Secretary,
Warrington and District Hospital Management Committee.
c/o General Hospital, Warrington, Lancs.

WARRINGTON GENERAL HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER (paediatrics), Male or Female, which will become vacant on 1st September, 1956. Post recognised for D.C.H. Scale of salary £745 p.a., less £130 for residential emoluments.

Applications to be forwarded to—
H. L. BOOT, Group Secretary,
Warrington and District Hospital Management Committee.
c/o General Hospital, Warrington, Lancs.

WARRINGTON INFIRMARY. (172 Beds.) Applications are invited for the vacant post of RESIDENT ANÆSTHETIST (Male or Female). Graded as Senior House Officer. The Hospital is recognised for the D.A. examination. Salary is £745 p.a., less a deduction of £130 p.a. for residential emoluments.

Applications, stating qualifications and experience, should be sent to— H. L. BOOT, Group Secretary,
Warrington and District Hospital Management Committee.
c/o General Hospital, Warrington, Lancs.

WOLVERHAMPTON GROUP.
The Royal Hospital, Wolverhampton (an Associated Hospital of the University of Birmingham Medical School)

SENIOR HOUSE OFFICER or HOUSE OFFICER required (E.N.T. Department), vacant now. Recognised for the D.L.O. and F.R.C.S. examination. Also listed as a pre-registration post.

HOUSE OFFICER (thoracic and general surgery), vacant 5th September. Also listed as a pre-registration post.

Apply Secretary, with copies of testimonials.

YORK COUNTY HOSPITAL. (General Hospital, 269 Beds with full Consultant staff.) CASUALTY OFFICER (with charge of orthopædic beds) required immediately. Junior Hospital Medical Officer grade, recognised for F.R.C.S. Resident or non-resident.

Applications, giving age, nationality, qualifications, experience and names of 2 referees, immediately to Group Secretary, York A and Tadcaster Hospital Management Committee, Bootham Park, York.

DUBLIN. SAINT LUKE'S HOSPITAL. Radiotherapeutic REGISTRAR. Salary scale: £850–£50–£1100 p.a. A Diploma in Radiotherapy essential. Appointment to the Hospital and its associated Clinics.

Applications (in writing), marked "R.R.," giving full details and the names of 3 referees, to the Registrar at Highfield-road, Rathgar, Dublin, not later than first post on 31st August, 1956. Canvassing disqualifies.

MULLINGAR. COUNTY HOSPITAL. Applications are invited from qualified medical practitioners for the position of REGISTRAR at the County Hospital, Mullingar, which will become vacant on 22nd September, 1956. Employment will be on a yearly basis renewable at the discretion of the health authority for further periods subject to a maximum period of 3 years. Salary scale £800–£100–£1000 per year, plus an additional £100 in respect of a higher degree. A bonus of £30 plus 6½% on the portion of the salary over £300 is at present payable. In determining point of entry on salary scale, credit may be allowed for previous experience as Registrar up to a maximum of 2 years. A deduction of £159 p.a. will be made in respect of board and apartments. A flat is available in the County Hospital.

Application forms and full particulars may be obtained from the County Secretary, Westmeath County Council, County Buildings, Mullingar, with whom completed applications should be lodged as soon as possible.

Public Appointments

BIRMINGHAM. CITY OF BIRMINGHAM. Public HEALTH DEPARTMENT. Applications invited from registered medical practitioners for post of ASSISTANT ADMINISTRATIVE MEDICAL OFFICER OF HEALTH (Male or Female). Candidates should hold the Diploma of Public Health. The successful candidate will have an opportunity to gain administrative experience in all branches of the Public Health Service, including maternity and child welfare. Salary scale £1315–£52 10s.–£1525 p.a. Commencing salary within the scale will depend upon the medical officer's experience. This scale is at present under review following the recent salary award. Pension scheme (including Widows and Orphans); medical examination. The successful applicant will be expected to take up duty in about 3 months time. The officer appointed will be required to devote his/her whole-time to official duties and the appointment will be subject to 3 months notice on either side.

Applications, with the names of 3 persons to whom reference may be made, to be sent to the Medical Officer of Health, Council House, Birmingham, 3, not later than 27th August, 1956.

BRIGHTON. COUNTY BOROUGH OF BRIGHTON. HEALTH DEPARTMENT. Applications are invited for the post of ASSISTANT MEDICAL OFFICER OF HEALTH. Diploma in Public Health essential. Duties mainly B.C.G. vaccination, infant welfare and epidemiology. Salary £1050–£1475 according to experience.

Application forms and further details from the Medical Officer of Health, Royal York Buildings, Brighton, 1.

W. O. DODD, Town Clerk.

CUMBERLAND. COUNTY OF CUMBERLAND. Applications are invited from registered medical practitioners holding the Diploma in Public Health for the mixed whole-time appointment of ASSISTANT COUNTY MEDICAL OFFICER AND MEDICAL OFFICER OF HEALTH to the Whitehaven Borough and the Ennerdale Rural District Councils (combined population 54,000). As an Assistant County Medical Officer he will be on the staff of the County Medical Officer for 5/11ths of his time. As Medical Officer of Health for the remaining 6/11ths of his time he will be subject to the Sanitary Officers' (Outside London) Regulations, 1935 and 1951, and to the control and direction of the respective district councils. The salary will be fixed within the range £1600, rising by increments according to scale to a maximum of £1962 in the terms of the Medical Whitley Council scales. Travelling and subsistence allowances in accordance with the National Joint Council scale for essential user. Office accommodation and clerical assistance will be provided.

Further particulars and forms of application obtainable from the County Medical Officer, 11, Portland-square, Carlisle, to whom applications should be submitted before 31st August, 1956.

DERBY. COUNTY BOROUGH OF DERBY. Education COMMITTEE. Applications are invited for the post of SCHOOL MEDICAL OFFICER AND ASSISTANT MEDICAL OFFICER OF HEALTH in the Public Health Department and School Health Service. Salary £1050–£1475. Applicants must be duly registered medical practitioners and the possession of the D.P.H. or D.C.H. is desirable, though not essential. Duties will include work in connection with School Health and Child Welfare Services, and such other duties as may be required by the Council. The Officer appointed will be required to devote his/her whole-time to the duties of the post, and to act under the instructions of the Medical Officer of Health. The post is superannuable, and the selected candidate will be required to pass a medical examination. The appointment will be held during the pleasure of the Council and is terminable by 2 months notice on either side.

Application forms may be obtained from the Director of Education, Education Office, Becket-street, Derby, to whom they should be returned, together with copies of not more than 2 recent testimonials, not later than 20th August, 1956.

G. H. EMLYN JONES, Town Clerk.

FACTORY DOCTORS. Factories Acts, 1937 and 1948. The following appointment as Appointed Factory Doctor is vacant. Apply to Chief Inspector of Factories, 19, St. James's-square, London, S.W.1.

District	*County*	*Latest date for receipt of applications*
TEIGNMOUTH ..	DEVON ..	1ST SEPTEMBER, 1956

FEDERATION OF RHODESIA AND NYASALAND. MINISTRY OF HEALTH. Vacancies exist for qualified Male MEDICAL LABORATORY TECHNICIANS. Applicants must have passed the Final Examination of the British Institute of Medical Laboratory Technicians or have the equivalent qualification. They should have not less than 8 years relevant experience since obtaining the qualification. Starting salary, £1170 on scale £1170–£50–£1470 (Scientific and Technical Officers Grade III). Promotion prospects.

Application forms and further details from, Public Service Attache, Rhodesia House, 429, Strand, London, W.C.2. Closing date 8th September.

NOTTINGHAMSHIRE COUNTY COUNCIL. Applications are invited for the appointment of SENIOR ADMINISTRATIVE MEDICAL OFFICER (Male) from duly qualified and registered medical practitioners who hold a Diploma in Public Health. Applicants should have had general administrative experience with a Local Health Authority and in connection with the School Health Service. Salary £1570 p.a.–£50 p.a.–£1620 p.a.–£55 p.a.–£2055 p.a. Within this scale the County Council are prepared to take into consideration the existing salary of the successful candidate in assessing his commencing salary.

Application forms and conditions of appointment are obtainable from me, and completed applications must be returned by 25th August, 1956.

A. R. DAVIS, Clerk of the County Council.

Shire Hall, Nottingham.

NOTTINGHAMSHIRE COUNTY COUNCIL. Hucknall URBAN DISTRICT COUNCIL. Mixed appointment. Applications are invited from registered medical practitioners for the mixed whole-time appointment of ASSISTANT COUNTY MEDICAL OFFICER AND MEDICAL OFFICER OF HEALTH to the Hucknall Urban District. Applicants must have had at least 3 years professional experience since qualifying, be experienced in the duties of Medical Officer of Health, School Medical Officer and the care of mothers and young children, and possess a Diploma in Public Health. Salaries are in accordance with the recommendations of the Medical Whitley Council for Public Health Medical Officers holding mixed appointments, namely :—

(*a*) As Assistant County Medical Officer (32/44ths) £954 10s. 11d.–£43 15s. 0d.–£1173 5s. 11d. (on scale £1200–£55–£1475, plus loading in accordance with Spens Formula).

(*b*) As Medical Officer of Health (12/44ths) £501 16s. 4d.–£15–£561 16s. 4d. (on scale £1740–£55–£1960, plus 12/44ths of £100).

Application forms and conditions of appointment are obtainable from my office and applications should reach me by 8th September, 1956. Canvassing disqualifies.

A. R. DAVIS, Clerk of the County Council.

Shire Hall, Nottingham.

DORSET COUNTY COUNCIL. Applications are invited from registered medical practitioners holding the Diploma in Public Health, for the joint appointment of ASSISTANT COUNTY MEDICAL OFFICER AND MEDICAL OFFICER OF HEALTH for Blandford Borough, Blandford Rural District, Wimborne Minster Urban District and Wimborne and Cranborne Rural District. Salary scale £1600 4s. 7d. rising by annual increments to £1961 14s. 1d. p.a.

Full particulars and application forms from the Clerk, County Hall, Dorchester, to be returned by 22nd September.

GOVERNMENT OF ADEN. Assistant Health Adviser required in the Western Aden Protectorate for executive and advisory duties. The post is of a pioneering nature involving much organising and touring. Oversea experience essential and experience in Arab countries and knowledge of Arabic would be added recommendations. Must possess medical qualifications registrable in the United Kingdom. Appointment can be on permanent basis with pension, or short-term contract with gratuity (taxable). Candidates in National Health Service may leave the National Health Service but retain their superannuation rights (up to 6 years) and receive a gratuity (taxable) of 20% of aggregate of salary at end of engagements. Salary scale from £1212 to £1992 a year, starting salary depending upon age and experience. Pension in the case of permanent appointment is at the rate of 1/600th of the final pensionable emoluments for each completed month of service. Gratuity in respect of contract appointment is £37 10s. for each completed 3 months of service. Outfit allowance of £30–£60 payable on appointment. Protectorate allowance of £132, £156 or £180 a year (non-pensionable) payable according to area in which working. Furnished quarters (being built) at low rental. Income-tax at local rates. Free passages are provided for Officer, wife, and up to 4 children under the age of 18. Tour of service from 18 to 24 months. Generous home leave granted after each tour.

Application forms from the Director of Recruitment, Colonial Office, London, S.W.1 (quoting No. BCD.117/2/08).

LINCOLN. COUNTY OF LINCOLN—parts of LINDSEY. ASSISTANT COUNTY MEDICAL OFFICER AND MEDICAL OFFICER OF HEALTH for the Barton-on-Humber and Brigg Urban and the Glanford Brigg Rural Districts. Applications are invited from registered medical practitioners with experience in public health work and holding a Diploma in Public Health, Sanitary Science or State Medicine for the above whole-time joint appointment. The salary which is in accordance with recommendations of the Medical Whitley Council Committee C as adopted by the County Council will commence at £1576 5s. 0d. p.a. and will rise by 3 annual increments of £58 14s. 11d., 1 of £61 17s. 5d., 4 of £34 7s. 6d., to a maximum of £1951 17s. 6d. The appointment will be subject to the Local Government Superannuation Acts, 1937 and 1953.

Forms of application and further particulars obtainable from the Clerk of the County Council, County Offices, Lincoln, to whom completed applications must be returned not later than 31st August, 1956.

H. COPLAND, Clerk of the Lindsey County Council.

MIDDLESEX COUNTY COUNCIL. County Health DEPARTMENT. ASSISTANT MEDICAL OFFICER (Male or Female) required initially in Area No. 1 (Edmonton and Enfield). Duties include supervision of health of school children, mothers and young children, attending health clinics and routine medical inspections at schools. Experience in these branches of public health work an advantage. Salary £975–£50–£1375 p.a. inclusive (under review). Established, pensionable, subject to medical assessment and prescribed conditions.

Apply (no forms), stating age, qualifications, experience and names of 2 referees, to Joint Area Medical Officer, Public Offices, Enfield, by 24th August (quote T.293L). Canvassing disqualifies.

KENNETH GOODACRE, Clerk of the County Council.

Guildhall, Westminster, S.W.1.

SURREY COUNTY COUNCIL. Applications are invited for the appointment of Full-time ASSISTANT MEDICAL OFFICERS. Applicants must possess either the D.P.H. or D.C.H. The main duties will be in connection with the School Health and Maternity and Child Welfare Services. Salary according to experience on the grade £1050–£50–£1200–£55–£1475 p.a. The appointment is subject to satisfactory medical examination, to the provisions of the Local Government Superannuation Acts, 1937–53, and to 3 months notice on either side.

Application forms from the County Medical Officer, County Hall, Kingston upon Thames, to be returned by 18th August, 1956.

LANCASHIRE COUNTY COUNCIL. Applications are invited from registered medical practitioners for appointment as ASSISTANT DIVISIONAL MEDICAL OFFICERS. Vacancies in or near Lancaster, Fylde, Preston, Bolton, Oldham, Stretford and Ashton-under-Lyne. Possession of Diploma in Public Health desirable. Salary £1050 rising to £1475 p.a. Travelling and subsistence allowances.

Application forms and further particulars from County Medical Officer, Serial 746, East Cliff County Offices, Preston. Application forms to be returned by 31st August, 1956.

TASMANIA. Applications are invited from medical practitioners registrable in Tasmania for the position of SPECIALIST ANÆSTHETIST in the public hospitals of the North West Group. Main hospitals are The Devon Public Hospital at Latrobe, Burnie Public Hospital, and the Spencer Public Hospital at Wynyard. Devon and Burnie Public Hospitals have a Surgeon-Superintendent, Medical Superintendent, and 2 Resident Medical Officers. Applicants should possess a recognised higher qualification in the specialty. The successful applicant will be expected to provide his own car, for which an allowance will be payable, according to horsepower, when used on duty. All electric semi-detached house at Burnie available. 4 weeks annual recreation leave. Superannuation benefits. Salary from £A2318 by annual increments of £A50 to £A2568, but an appointment at the maximum figure may be made provided suitable qualifications are held. Assisted passages for appointee and family can be arranged, or alternatively, forward fares only will be refunded over a period of 5 years service with the North West Hospital Group.

Applications in duplicate to the Agent-General for Tasmania, 457, Strand, London, W.C.2, by 25th August, 1956, from whom further details may be obtained.

General Practice

For an Executive Council post (England and Wales) apply on form E.C.16A obtainable from the council. Mark envelope "Vacancy."

GREAT YARMOUTH, NORFOLK. Applications invited for VACANCY (chiefly urban). List at present 2080. Surgery accommodation available and possibly residence. Apply on Form E.C.16A before 25th August, 1956, to—

W. J. HALL, Clerk to the Great Yarmouth Executive Council.
17, South-quay, Great Yarmouth.

LANGDON HILLS, BASILDON, ESSEX. Applications invited for retirement VACANCY (urban). List at present approximately 2000. Residential and surgery accommodation will be available by purchase. Apply on Form E.C.16A by first post on 24th August, 1956, to—

E. BERGDAHL, Clerk of the Council.
Essex Executive Council, 131/3, Fillebrook-road, Leytonstone, E.11.

SILLOTH, CUMBERLAND. Applications are invited for VACANCY (mixed urban and rural) owing to resignation of practitioner. List at present date approximately 2185. Intermediate area. Residence and surgery available. Apply on Form E.C.16A by 27th August, 1956, to—

F. M. SMITH, Clerk to Cumberland Executive Council.
7, Chatsworth-square, Carlisle.

Hospital Services : Non-Medical Appointments

CHELMSFORD HOSPITAL MANAGEMENT COM-MITTEE. PRINCIPAL BIOCHEMIST (non-medically qualified) required for newly built Group Pathological Laboratory at the Chelmsford and Essex Hospital.

Applications, giving the names of 2 referees, by 1st September to Group Secretary, Chelmsford Hospital Management Committee, London-road, Chelmsford, Essex.

Miscellaneous

The Wellcome Trustees have a vacancy for a Male medical graduate as Assistant Scientific Secretary. Organising ability and clarity of expression in speech and writing are essential, and it would be useful if the candidate had had some experience of research. Salary £1650 at age 35 rising to £2250. Starting pay reduced by £50 p.a. for each year below 35. Superannuation provision. Appointment probationary for 1 year, subject to confirmation if satisfactory.

Applications (giving full details of education and experience, and names and addresses of 2 referees) should be sent before 31st August to the Scientific Secretary, The Wellcome Trust, 24, Harley-street, London, W.1.

Propr. of South Coast Nursing-home of good standing and highest references would like to contact Doctor with view to partnership, equal shares. Excellent business capable of expansion and good return. No staff problems. Offers for outright sale not desired but considered.—Address, No. 239, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

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